

# Occupational Outlook Handbook

1961 EDITION

Career Information  
for Use in Guidance

UNITED STATES DEPARTMENT OF LABOR

Arthur J. Goldberg, *Secretary*

BUREAU OF LABOR STATISTICS

Ewan Clague, *Commissioner*



## Pointers on Using the Handbook

**To find out what is in this book and how it is arranged,** see  
Guide to the Handbook, page 4.

**To locate an occupation or industry in this book,** see:

Table of Contents, page XI.

Alphabetical Index, page 812.

Occupations Classified by Broad Fields of Work, page 803. This list can be used to find occupations suitable for a person with certain types of abilities or interests.

**For a general view of work and jobs** in the United States, read the chapter on  
Looking Ahead to Earning a Living, page 11.

**Forecasts of the future are precarious!** In interpreting the statements on the outlook in each occupation, keep in mind the points made on page 5.

**The job picture is constantly changing.** To find out how you can keep your information up to date, see the chapter on Where To Go for More Information and Assistance, page 7.

**You may need local information too.** This book gives facts about each occupation for the United States as a whole. For suggestions on where to get information for your own locality, see page 8.

# OCCUPATIONAL OUTLOOK HANDBOOK

**EMPLOYMENT INFORMATION ON MAJOR OCCUPATIONS  
FOR USE IN GUIDANCE**

1961 edition

**Bulletin No. 1300**

(Revision of Bulletin 1255)

**UNITED STATES DEPARTMENT OF LABOR**

**Arthur J. Goldberg, Secretary**

**BUREAU OF LABOR STATISTICS**

**Ewan Clague, Commissioner**



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This volume was prepared by the U.S. Department of Labor's Bureau of Labor Statistics with the cooperation of the following Bureaus of the Department—

**Bureau of Employment Security**  
**Robert C. Goodwin, Director**

**Women's Bureau**  
**Esther Peterson, Director**

**Bureau of Apprenticeship and Training**  
**W. C. Christensen, Director**

**Bureau of Labor Standards**  
**Arthur W. Motley, Director**

and the—

**Veterans Administration**

**U.S. Department of Agriculture**

**U.S. Department of Health, Education, and Welfare**



## Foreword

The Department of Labor takes pride in issuing this fifth edition of the Occupational Outlook Handbook. We hope the information here presented on the employment outlook in more than 650 occupations will be of assistance to young people concerned with making a career choice and to the counselors responsible for aiding them in this momentous decision.

The process of occupational choice and development is likely to become steadily more complex and difficult in the decade ahead. The space age will bring with it very rapid technological developments and consequent shifts in occupational requirements. Furthermore, the number of young people completing school and entering the labor market will be far greater than ever before, and competition for employment is likely in many entry occupations. At the same time, the country will continue to have urgent need of highly qualified workers in many occupations, especially in the professional and skilled categories.

It has been our aim to include in this Handbook the best possible assessment of future manpower needs and employment opportunities in the wide range of occupations discussed. By bringing this information to young people's attention and helping them to relate it to their own aptitudes and interests, counselors can assist boys and girls to find occupations which promise opportunities for them to realize their full potential. They can thus contribute not only to the life adjustment of millions of individuals but also to the economic growth of the country and its defense and welfare.

ARTHUR J. GOLDBERG, *Secretary of Labor*

## Prefatory Note

This fifth edition of the Occupational Outlook Handbook, which supersedes the fourth edition, Bulletin 1255, is designed to provide the occupational information young people need to help them in career decisions. It presents a reappraisal of the employment outlook in the occupations and industries discussed in the previous edition, together with the most recent information on earnings, training requirements, and other related topics which was available early in 1961 when the book went to press.

In addition, the occupational coverage of the Handbook has been significantly expanded. To help meet a widely recognized need for information on jobs open to young people with little or no specialized training, this edition includes new chapters on factory jobs and post office occupations. Business administration and related professions are also covered in a comprehensive new chapter. Other occupational groups on which chapters have been added include astronomers, geographers, electronic computer operating personnel, musicians and others in the performing arts, photographers, appliance servicemen, apparel industry workers, and dental laboratory technicians.

This Handbook reflects the results of two decades of research by the Occupational Outlook Service, which was established in the Bureau of Labor Statistics by the Congress in 1940. The first edition of the Handbook was published in 1949, with subsequent editions in 1951, 1957, and 1959. The more than 160,000 copies of these editions which have been sold attest to the widespread need for occupational outlook information. Counselors in many high schools, colleges, and community agencies throughout the Nation rely on the Handbook in their vocational guidance work, as do Federal and State agencies offering counseling services—including the Veterans Administration, the Department of Defense, State rehabilitation agencies, and offices of State employment services affiliated with the U.S. Employment Service.

In 1955, the Congress provided for the maintenance of the Occupational Outlook Handbook and related publications on a regular basis. This action has made possible the present edition of the Handbook; the publication of a periodical, the Occupational Outlook Quarterly, which provides a continuous flow of current information between editions of the Handbook; and the Occupational Outlook Report Series, a set of reprints of the Handbook statements on different fields of work.

The Bureau of Labor Statistics wishes to acknowledge with gratitude the cooperation of hundreds of business organizations, unions, trade associations, educational institutions, professional societies, and government agencies whose officials gave freely of their time in discussing employment trends in their respective fields, in supplying information, and in reviewing and commenting upon drafts of the various chapters. Thanks are due also to the Women's Bureau and the Bureau of Employment Security of the U.S. Department of Labor, the Agricultural Research Service of the U.S. Department of Agriculture, and the Office of Education of the U.S. Department of Health, Education, and Welfare, for their special contributions.

EWAN CLAGUE, *Commissioner of Labor Statistics*

## Letter From the Veterans Administration

The Veterans Administration has cooperated with the Bureau of Labor Statistics, U.S. Department of Labor, in the support and development of this Handbook since its inception in the late 1940's. This cooperation began, and has continued, in direct fulfillment of a statutory requirement that the Administrator of Veterans Affairs make current and reliable information on occupations available to counselees and trainees participating in the Vocational Rehabilitation and Education programs. The progressive improvement of the Handbook and its increasing acceptance among counselors and other personnel workers throughout the United States are indeed gratifying.

The Handbook, the supplemental Occupational Outlook Quarterly, and periodic cooperative pamphlets on the employment outlook in specially selected fields of work provide a basic, coordinated, and increasingly effective source of authoritative and current occupational outlook information for VA counseling and training activities. This new edition of the Handbook reflects still further advancement in the content and presentation of outlook information. The Veterans Administration is glad to take this opportunity both to commend the Bureau of Labor Statistics for its leadership and responsiveness in this continuing qualitative improvement and to recommend this publication as a major reference for occupational information libraries throughout the Nation.

J. S. GLEASON, JR., *Administrator*  
*Veterans Affairs*

## Letter From the Bureau of Employment Security

The Bureau of Employment Security welcomes this fifth edition of the Occupational Outlook Handbook as warmly as it has welcomed the earlier ones. The Bureau shares the opinion of the many experts in the fields of occupational information and counseling who regard it as a most important reference document on occupational and industrial fields in our economy. That this comprehensive and authoritative work is kept current and expanded in scope and quality with each succeeding edition is of real benefit to this Bureau and to other organizations responsible for counseling and placement.

Over 10 million jobseekers come to local employment service offices each year. More than 1 million of them receive employment counseling in these offices. Employment service counselors use the Occupational Outlook Handbook as an important source of national information to supplement the local, State, and national information they get through regular employment service channels. Employment service counselors also encourage counselees to read the Handbook for information that will help them in determining the extent of their interest in specific occupational fields and their possible qualifications for entering these fields. A copy of the Handbook is available for reference in each of the 1,800 local employment service offices.

Occupational choice is so wide, and yet so critical to our manpower outlook, that the prospective worker must have the most reliable and up-to-date factual information on which to base his vocational decision. In recent years, the need for such information has heightened, as automation has resulted in greater displacement of workers who must find other work they can do. Increasingly, people seek professional help from a counselor in analyzing their own interests and abilities, and in matching these characteristics to job demands and employment possibilities. Such counseling help, along with job placement, testing, and other related services, is available in local employment service offices throughout the Nation. A brief description of what the public employment offices offer the jobseeker appears on page —.

On behalf of the Bureau of Employment Security and the affiliated State employment security agencies, I extend to all readers of the Handbook who are making occupational choices an invitation to go to the nearest local office of the State employment service if they wish additional information and assistance in formulating page 8.

ROBERT C. GOODWIN, *Director*  
*Bureau of Employment Security*

## Letter From American Personnel and Guidance Association

In a society as mobile and dynamic as ours—and there is every evidence that it will be increasingly so—reliable, up-to-date information about occupations is a need deserving high priority. In the eyes of knowledgeable counselors, the Occupational Outlook Handbook has always been identified as the sourcebook for such information. Each new edition is reassuring to counselors who, with but a flick of a few pages, are able to provide authentic and current information.

This fifth edition of the Occupational Outlook Handbook continues the high standards of its illustrious predecessors. It is not only a new edition but also an improved one, with a more comprehensive coverage of occupations, some simplification in the language used, and format changes that add to its general attractiveness.

Even though counselors are exceptionally busy people, they will find it worth their efforts to read the Occupational Outlook Handbook from cover to cover. It may take the better part of a vacation but, as a reward, they will receive a most insightful orientation to the world of work. And to keep information from the Handbook up to date, they may wish to use the Occupational Outlook Quarterly, a periodical which presents current occupational research and information.

As a representative of the American Personnel and Guidance Association, it is a privilege to commend the Bureau of Labor Statistics for its research program and for its presentation of that research in the fifth edition of the Occupational Outlook Handbook. Continuity in the occupational outlook program has been and will remain critical. Without continuity in this program of the Bureau of Labor Statistics, counselors would soon be at the mercy of inaccurate and misleading information, reducing career planning to absurdities. It is, therefore, a pleasure to express appreciation for the fifth Handbook on behalf of thousands of counselors and those individuals who ultimately use the information in their personal career-planning activities.

EDWARD C. ROEBER, *President*  
*American Personnel and Guidance Association*

## Contributors

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James J. Treires assisted in the preliminary planning of the Handbook, reviewed the manuscripts for consistency with vocational guidance standards, and coordinated the preparation of the introductory sections and the statements prepared by agencies outside the Bureau of Labor Statistics. Verna E. Griffin assisted in the review of these statements. J. Sue White aided in the planning and review of the charts and the format of the book.

Reports on 14 occupations in which women predominate were prepared in the Women's Bureau of the U.S. Department of Labor under the direction of Stella P. Manor, Jean A. Wells, and Mary Murphy. The following individuals wrote the various reports: Caroline Cherrix, Audrey Freedman, Caryl Holiber, and Drucilla Hopper.

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The cover symbol and cover were designed, respectively, by John J. Kennelly, Chief, and Jon Massey, of the Division of Visual Services,

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## Note

A great many trade associations, professional societies, unions, and other organizations in industry are in a position to supply valuable information to counselors or young people seeking information about careers. For the convenience of users of this *Handbook*, the reports on separate occupations or industries list some of the organizations or other sources which may be able to provide further information. Although these references were assembled with care, the Bureau of Labor Statistics has no authority or facilities for investigating organizations. Also, since the Bureau has no way of knowing in advance what information or publications each organization may send in answer to a request, the Bureau cannot evaluate the accuracy of such information. *The listing of an organization, therefore, does not in any way constitute an endorsement or recommendation by the Bureau or the U.S. Department of Labor, either of the organization and its activities or of the information it may supply.* Such information as each organization may issue is, of course, sent out on its own responsibility.

*The occupational statements in this Handbook are not intended, and should not be used, as standards for the determination of wages, hours, jurisdictional matters, appropriate bargaining units, or formal job evaluation systems.* These descriptive statements are presented in a general, composite form and, therefore, cannot be expected to apply exactly to specific jobs in a particular industry, establishment, or locality.



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# OCCUPATIONAL OUTLOOK HANDBOOK

## Using the Handbook In Guidance

In 1949, the first edition of the Occupational Outlook Handbook filled a void felt by vocational counselors in Veterans Guidance Centers throughout the United States. The counselors had been calling on their limited knowledge, reasonable deductions, and imagination to answer veterans' questions about the present and future of occupations. The Handbook appeared because it was needed. Now in its fifth edition, it has found a much wider readership and has become an invaluable tool of guidance and placement.

The Handbook and guidance have grown up together and are mutually dependent on each other. In the guidance field, the Handbook is used by several groups. At the college level, the counselor educator explains its contents to counselor trainees to help them understand specific job patterns, characteristics of related occupations, and trends affecting the nature and number of jobs. More important, the counselor educator teaches the future counselors to use the Handbook in everyday guidance.

At the secondary school level, the teacher of occupations finds the Handbook organized and written in such readable language that his students can use it as a reference book in comprehending different kinds and levels of work, and in informing themselves about careers of personal interest.

However, at both secondary and collegiate levels, the Handbook is most valued by the counselor on the job, and the student who seeks help in choosing a career. The counselor utilizes all available facts about the youth sitting across the desk, and about the jobs that might be

suitable. Planning for the future requires interpretation of economic and political news, anticipation of the effect of science and inventions on vocational fields, and estimates of changing occupational emphases. Few counselors possess this information and the vision to correlate it for guidance.

So the Occupational Outlook Handbook does part of the job. It makes use of nationwide statistics in projecting the future in over 650 of the job fields of most interest to students. It brings descriptions of jobs up to date, and advises and warns the prospective worker as to the upswing or downswing indicated by the most reliable data.

The Handbook is supplemented by other publications listed on page 827 to provide a continuous flow of information on the employment outlook. The counselor who fails to avail himself of these materials lacks the most authentic and current data about occupations.

J. A. Stratton, president of the Massachusetts Institute of Technology, said over 2 years ago, that half of all we know in science has been learned in the last 10 years, and that our scientific knowledge would double in the next 5 years, and continue to multiply at an ever-increasing rate. Consequently, most occupations which are affected by scientific knowledge—and what job is not?—will be subject to change. As work patterns move with the times, worker functions, too, will shift.

Since many occupations which will be covered in the Handbook a decade hence have not yet been created, a student with some years of preparation before him may be encouraged

to elect a broad program of courses and perhaps identify a general area of interest such as science, social studies, or art. Specialization may be delayed until a later date. The further one goes in school, the more time he will have to select his major field. The more familiar he is with areas of work as described in the Handbook, the better prepared he will be to plan his own future as he goes along.

Most of the career information in the Handbook follows a uniform outline: Nature of Work; Where Employed; Training and Other Qualifications; Employment Outlook; Earnings and Working Conditions; and Where To Go for More Information. The descriptions include basic information from which the counselor can deduce values which contribute to job satisfaction. The effective counselor must be aware of these all-important aspects of work, and also acquaint the student with the economic, political, social, artistic, or scientific values to be derived.

The counselor has information about the student in his files to help with the process of matching work to the worker. He assists the student in considering vocational goals or areas which will utilize his strongest potentials—intelligence, special talents, personality, interests, and values. Probing hobbies and cocurricular activities, as well as reviewing school grades and test results, make the student aware of abilities which he might use on a job. Thus, the counselor may relate model shipbuilding to aspects of watch repairing, or holding a class office to selling.

It is not necessary that a high school student choose from the Handbook one job which will meet all of his criteria for a life work. About 50 percent of the students who go to college change their majors specified at entry, before graduation. Graduate level courses frequently alter the emphasis in career planning. In the business field, too, there is much job shifting. Using the Handbook, one can open vistas to the student, pointing out several occupational areas to which specific training may lead, and additional courses or experience which may qualify him for advancement. Counseling at the high school level, therefore, should prepare the student to do some self-counseling subsequently,

as he acquires experience and information in new fields.

A counselor needs to weigh what the Handbook indicates are the usual demands of a job, and what the person in front of him offers. Sometimes, ambition and determination compensate for less-than-promising qualifications for specific work. When the qualifications are based on test results, the chance for error in interpretation must be considered. Errors may be due to factors in the test or in the student, and even the best test gives only a rough estimate of what it is designed to measure.

Of the various steps on an occupational ladder, the one at the top usually has the greatest appeal. This can be a reasonable goal for one who easily meets all of the requirements. A wise counselor, however, will spell out for the counselee the hurdles involved, and let the latter make his choice on the basis of his likely success on the various rungs. Thus, mathematical ability which is insufficient to qualify a student for engineering may be adequate for a related nondegree technical course. Similarly, one may aspire to become a doctor, but there are other health service careers which involve less training and talent and may serve as alternative objectives.

Good counseling consists of opening up an area of related occupations, with the path to each precisely delineated. The Handbook groups together vocations which have common bases; the counselor should assist the student in selecting a basic program upon which he will build later when he has determined the specific character of work for which he is best qualified.

The Handbook stresses the point that forecasts of the future are precarious. Scientific discoveries and inventions, national and international situations, and even styles and fads can affect the economy and hence the demand for workers in certain fields. The Handbook is a valuable guide to national occupational trends, but it makes no claim to infallibility. It underlines the warning that local conditions do not always mirror the national scene. What is set down in black and white must be qualified by events which affect the particular labor market.

Counselors, students, and parents can profit



from the Handbook's analyses of occupations. Teachers of occupations and counselor educators can also utilize the data presented between its covers. To understand the factors contributing to the stability of labor in general, and jobs in particular, it is urged that all professionally prepared persons who use the Occupational Outlook Handbook read the introductory sections.

Guidance is not an exact science. Youth matures and jobs evolve, and the counselor must function in the present to effect a compatible union of worker and work at some time

in the future. Intelligent use of the Handbook can give a counselor a sense of assurance that after he understands what the counselee brings to his potential job, he can suggest the work areas which meet those qualifications. A wise counselor and the Handbook make a good team.

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# Guide to the Handbook

This book answers many questions young people ask when they are interested in choosing an occupation. It gives information on occupations—on the employment outlook in each field,

the nature of the work, training, and other qualifications needed for entry, lines of advancement, where jobs are located, and earnings and working conditions.

## How the Handbook Is Organized

### Introductory Chapters

The Handbook starts off with three introductory chapters, designed to help counselors and young people make effective use of the book and to give them a general view of the world of work.

This chapter, the Guide to the Handbook, describes the contents and organization of the book. It tells how the information was assembled and discusses a number of points which need to be borne in mind in interpreting the statements made. The second introductory chapter gives suggestions regarding supplementary sources of occupational information and tells how readers can keep up to date on developments affecting the employment outlook in different occupations. It also contains a brief description of the counseling, placement, and other services available to jobseekers at local offices of State employment services affiliated with the U.S. Employment Service. The final introductory chapter describes some of the most important trends in population and employment, both past and prospective, and provides a needed background for interpreting the reports on particular occupations.

### Occupational Reports

The reports on different fields of work make up the main body of the book. They are arranged in chapters dealing with groups of related occupations. These chapters are

grouped, in turn, into seven major divisions of the book: professional, administrative, and related occupations; clerical and sales occupations; service occupations; skilled trades and other industrial occupations; some major industries and their occupations; agricultural occupations; and occupations in government.

### Indexes and Appendix

To help readers locate information on the occupations in which they are interested, a list of the occupational reports is included in the table of contents at the front of the book. Persons wishing to find statements on occupations related to a general field of interest—for example, artistic, technical, managerial, clerical, or manipulative work—may do so by referring to the Index to Occupations Classified by Broad Fields of Work, the first of the two indexes at the back of the book. The second index lists occupations and industries alphabetically for easy reference.

The Technical Appendix contains a discussion of the sources and methods used in analyzing the occupational outlook in different fields of work. It is designed for readers wishing more information on this subject than is included in the present chapter. The appendix also contains an explanation of the D.O.T. numbers given in the occupational reports, to indicate where each occupation fits into the classification system of the Dictionary of Occupational Titles.

## Some Important Facts About the Occupational Reports

### Occupations Covered

The more than 650 occupations discussed include those of greatest interest to young people. Most of the large ones requiring long periods of education or training are discussed, as are a number of small but rapidly growing fields and other occupations of special interest for various reasons. Altogether, the occupations covered account for about 90 percent of all workers in professional and related and in sales occupations; nearly as high a proportion in skilled occupations; over half in clerical and in service occupations (outside private households); and smaller proportions in administrative and semiskilled occupations. The main types of farming are also discussed.

General information on many fields of work not covered in the occupational reports is contained in the introductions to the major divisions of the book. These introductions are also designed to aid the reader in interpreting the reports on individual occupations.

### Sources of Information

Information on employment trends and outlook and the many related topics discussed in the occupational reports was drawn from a great variety of sources. It is based in part on extensive field investigation carried out by the Bureau of Labor Statistics professional staff; interviews with hundreds of persons in industry, unions, trade associations, and public agencies provided a wealth of up-to-date information. In addition, the Bureau's other research programs supplied data on employment in different industries, productivity and technological developments, wages and working conditions, trade union agreements, accident hazards, and a number of other topics. Other agencies of the Federal Government—among them, the Bureau of Apprenticeship and Training and Bureau of Employment Security in the Department of Labor, the Bureau of the Census of the Department of Commerce; the Office of Education of the Department of Health, Education, and Welfare; the Civil Service Commission; the

Interstate Commerce Commission; the Civil Aeronautics Administration; and the Federal Communications Commission—provided additional data regarding the nature of the work in various occupations, training and licensing requirements, wages, and employment trends. Many other public and private organizations—including State licensing boards, educational institutions, business firms, professional societies, trade associations, and trade unions—also made available published and unpublished data and supplied much helpful information through interviews.

By bringing together and analyzing information from these many sources, conclusions were reached as to prospective employment trends in the occupations covered by this Handbook. In addition, estimates were made of the numbers of job openings which will be created by retirements and deaths. The supply of new workers likely to be available in particular fields was also analyzed, by studying statistics on high school and college enrollments and graduations and data on the numbers of apprentices in skilled trades.

When preliminary drafts of the occupational reports had been completed, these were reviewed by officials of leading companies, trade associations, trade unions, professional societies, and other experts. The information and conclusions presented in each report thus reflect the knowledge and judgment not only of the Bureau of Labor Statistics staff but also of leaders in the field discussed, although the Bureau, of course, takes full responsibility for all statements made.

### Points To Bear in Mind in Using the Reports

In using the information which this book contains about employment prospects, it is important to keep in mind that all conclusions about the economic future necessarily rest on certain assumptions. For practical purposes, in vocational guidance, the statements on employment outlook in the Handbook assume: (1) that high levels of economic activity and employment will be maintained over the long run even though there may be temporary recessions;

(2) that there will be no major war but, at the same time, the defense program will continue at about the current level; (3) that scientific and technological advances will continue; (4) that the institutions and fundamental economic structure of the United States will not change significantly.

These assumptions are believed to be the ones most useful for practical purposes in vocational guidance. A catastrophe such as a war or a severe and prolonged economic depression would, of course, create an employment situation entirely different from that likely to develop under the assumed conditions. But young people cannot build their lifetime plans in expectation of such unpredictable catastrophes, though, on the basis of historical experience, they must be prepared to weather economic ups and downs during their working lives.

To avoid constant repetition, the assumptions are seldom mentioned in the reports on the many fields of work where the impact of a general decline in business or a change in the scale of mobilization would probably be about the same as in the economy as a whole. On the other hand, in the statements on occupations where employment tends either to be unusually stable or to be especially subject to ups and downs, these facts are indicated. Even in the latter occupations, however, long-term trends in employment are more important than short-run fluctuations in appraising the outlook in connection with an individual's choice of a lifetime career.

It should be noted also that the picture of

employment opportunities given in this book applies to the country as a whole unless otherwise indicated. People who want supplementary information on job opportunities in their communities should consult local sources of information, as suggested in the following chapter of the Handbook.

The information presented on earnings and working conditions, as on other subjects, represents the most recent available when the Handbook was prepared early in 1961. Much of the information came from Bureau of Labor Statistics surveys, but many other sources were also utilized. For this reason, the earnings data presented in the various occupational reports often refer to different periods of time, cover varying geographic areas, and represent different kinds of statistical measures. Comparisons between the earnings data for different occupations should, therefore, be made with great caution.

Finally, it should be borne in mind that information on occupations and the employment opportunities they offer is only part of that needed in a career decision, which means matching a person and an occupation. The other part relates, of course, to the potential worker himself—his interests and aptitudes. People can obtain help in assessing their own abilities and interests and in selecting the occupation for which they are best suited from vocational counselors in schools and colleges, State employment service offices, Veterans Administration regional offices and guidance centers, and many community agencies.

# Where To Go for More Information or Assistance

Persons using this Handbook may want more detail on some of the occupations discussed in the occupational reports, or information on fields of work which could not be covered in this publication.

Suggestions as to sources of additional information on the occupations discussed are given in most of the occupational reports. In addition, several types of publications of the U.S. Department of Labor, including periodicals described on pages 827-828 of this Handbook, provide further information on topics such as earnings, hours of work, and working conditions. Other sources likely to be helpful include the following:

## **Public Libraries**

These libraries usually have on their shelves many books, pamphlets, and magazine articles giving information about different occupations. They may also have several books and current indexes which list the great numbers of publications on occupations, and the librarians may be of assistance in finding the best ones on a particular field of work.

## **Schools**

School libraries and guidance offices often have the same kinds of reading materials on occupations. In addition, school counselors and teachers usually know of any local occupational information which has been assembled through special surveys made by schools or by other

community agencies. Teachers of special subjects such as music, printing, and shorthand can often give information about occupations related to the subjects they teach.

## **State Employment Services**

Counselors in local public employment offices are in a particularly good position to supply information about job opportunities, hiring standards, and wages in their localities. (The services available through the public employment offices are described in the concluding section of this chapter.)

## **Business Establishments**

Employers and personnel officers can usually supply information about the nature of the work performed by employees in their industry or business and the qualifications needed for various jobs, as well as other facts about employment conditions and opportunities. The names of local firms in a particular industry can be found in the classified sections of telephone directories or can be obtained from local chambers of commerce.

## **Trade Unions, Employers' Associations, and Professional Societies**

Frequently, these organizations have local branches, with officials who can supply information relating to the occupations with which they are concerned.

## Keeping Up To Date on the Occupational Outlook

The present edition of the Handbook, like all previous editions, incorporates the most recent occupational information available when the

book was prepared for publication early in 1961.

The Bureau of Labor Statistics also issues

a periodical, the Occupational Outlook Quarterly, to keep readers up to date between editions of the Handbook, on developments affecting employment opportunities and on the findings of new occupational outlook research. In addition, the Bureau issues at irregular intervals occupational outlook bulletins which give much more detailed information on various fields of work than can be included either in the Handbook or in the Occupational Outlook Quarterly. Further information about these publications,

and directions for ordering them, will be found on page 829 of the Handbook.

The Bureau will be glad to place the name of any user of this Handbook on its mailing list to receive announcements of new publications and releases summarizing the results of new studies. Anyone wishing to receive such materials should send the requests, with his address, to the Bureau of Labor Statistics, U.S. Department of Labor, Washington 25, D.C.

## Services to Jobseekers at Public Employment Offices

Many of the readers of this Handbook want assistance in choosing a suitable type of work and in finding the right job. The reader who wants professional assistance from trained employment counselors should know about the services of his local public employment office.

The U.S. Employment Service and affiliated State employment services form a nationwide organization which plays an important part in our economy. Through 1,800 local offices, conveniently located in cities and towns throughout the United States, this employment service finds jobs for workers and workers for jobs.

Although the employment service is a Federal-State system, each employment office is basically a local community organization. It is concerned with facilitating suitable and stable employment for the community's working population and with adequately meeting the manpower needs of the employers. Because of this concern, the local office tries to do more than merely refer a worker to a job—it tries to match the worker and job so that the requirements of each are satisfied. To do this, the public employment office has developed a number of services that are available to all jobseekers. Many of these are particularly important to young men and women entering the world of work for the first time.

### Counseling Services

Employment service counseling assists both young people leaving school and experienced workers who wish or need to change their field

of work in choosing and adjusting to a suitable field of work.

The major purposes of employment counseling are to help people gain insight into their actual or potential abilities, their interests, and their personal traits; to understand something of the nature of occupations; and to make the best use of their capacities and preferences in the light of available job opportunities.

In the employment service, the counselor has a great store of resources, including testing facilities and labor market and occupational information.

*Testing.* Most local offices provide testing services, including the General Aptitude Test Battery, which measures basic abilities for many and varied broad fields of work and for about 850 specific jobs within these fields. These tests help the applicant appraise his abilities. They may reveal aptitudes the jobseeker did not know he had.

*Labor Market Information.* The State employment office counselor has information about jobs in the community. He knows what kinds of jobs prevail in local industry, which jobs are more plentiful, what the hiring requirements and the opportunities for promotion are, and what the jobs pay. In many labor market areas, the counselor has information about future occupational opportunities, based on area skill surveys which usually cover employers' forecasts of their long-range requirements. He may also have detailed occupational guides

covering specific jobs in the community. In addition, since his office is a part of the nationwide employment service, the counselor has information regarding employment opportunities in other areas all over the country.

*Occupational Information.* The employment service office has occupational information which helps the job applicant decide whether he is suited to a particular kind of work. The Dictionary of Occupational Titles, Job Descriptions, Estimates of Worker Traits for 4,000 Jobs, and other compilations describe the work performed in the various occupations and the training required, lines of advancement, physical demands, and working conditions for most occupations. Recent publications of the type on file in the employment offices include: Occupations in Electronic Data Processing Systems, Technical Occupations in Research, Design, and Development Considered as Directly Supporting to Engineers and Physical Scientists, and Selected Occupations Concerned with Atomic Energy.

*Cooperative Arrangements With Other Community Groups.* Local employment office counselors work closely with other public and private agencies and organizations which provide special services that the jobseeker may need in order to become better prepared for employment. These groups include educational, training, vocational rehabilitation, and health and welfare agencies.

#### **Placement Assistance**

The primary objectives of the placement service in the local employment office are to fill employers' job openings with occupationally qualified workers and to locate employment for workers which is suited to their skills, knowledge, and abilities. The employment office placement service is designed to eliminate the waste of "hit-or-miss" job hunting.

*Local Openings.* State employment office personnel maintain regular contacts with local employers and know their hiring needs and their jobs. Placement interviewers receive re-

quests from employers for all kinds of workers. Through the local office, therefore, the job applicant has access to a variety of job vacancies with many employers, just as the employer has access to many applicants. When no suitable job exists for an individual worker, the employment service may attempt to solicit an opening for him from likely employers.

*Jobs Throughout the Country.* The job clearance system of the nationwide network of State employment offices offers the applicant an opportunity to qualify for jobs outside his area, elsewhere in the State and the Nation, and even in foreign countries. Each State employment service prepares frequent inventories of hard-to-fill jobs which are distributed to all other State employment services. This makes it possible for them to refer local workers to out-of-area jobs for which they qualify. In addition, a national network of highly specialized professional placement offices has been established with the State employment service in order to speed the matching of jobs and applicants in professional fields.

*Placement Aids.* As in counseling, the information on local job opportunities for industries, occupations, and areas, and on occupational requirements which is available in the employment offices contributes greatly to getting the right job for the worker and the right worker for the job. Also available to the jobseeker are aptitude and proficiency tests which help determine whether an applicant is qualified to perform satisfactorily on specific jobs.

#### **Services to Special Worker Groups**

The employment service has developed techniques and procedures for particular applicant groups who may encounter special problems in their search for suitable jobs.

Special services to youths include emphasis on counseling graduating students and school dropouts, and intensive efforts to promote employment opportunities for them. In many cities, employment service offices have cooperative arrangements with high schools to provide counseling, testing, occupational information,

and placement services to seniors prior to their graduation, as well as to those who leave school earlier. Such arrangements were in effect in over 9,000 high schools in the school year 1959-60.

The State employment offices have long maintained an active program for helping applicants with vocational handicaps. The emphasis is on what these people can do with their abilities rather than on what they cannot do because of a disability.

Special services for veterans are provided by the employment service. In each local office, there is a veterans' representative who is fully informed regarding veterans' rights and benefits and who carries on job promotion for veterans. In addition, he assists veterans in making use of the usual counseling, placement, and other services provided by local office staff.

The employment service also has developed techniques to deal with job problems of middle-age and older workers. Special attention is

given to assist them to make realistic job choices and to overcome problems related to getting and holding a job. Employers have been encouraged to remove age restrictions on hiring and to hire only according to the qualifications of the individual.

Similar attention is also given to job problems of members of minority groups and others facing special difficulties in obtaining suitable employment.

#### **How To Locate the Local Employment Office**

The addresses and telephone numbers of local offices of State employment services affiliated with the U.S. Employment Service may be found in local telephone directories. Jobseekers, employers, schools, and public and private agencies aiding clients to find employment are invited to utilize the services of the public employment offices in their communities and to avail themselves of the fund of job information maintained in these offices.



# Looking Ahead To Earning A Living

Choosing the way to earn one's living is probably as important a decision as a person ever makes in his entire lifetime. If occupational goals are thought about early, they can be a guide to the kind and amount of education to plan for. If consideration of occupational choice is postponed too long, the necessary education or training may be much more difficult to obtain. Education and occupation are together an index to probable future income and chances for steady employment, and hence to the kind of home one can provide for a family, one's chance for leisure, and, eventually, security in old age. In other words, when teachers and parents and counselors urge boys and girls to start thinking seriously about the kind of work they want to do, they are not just talking about getting a job—they are inviting them to start mapping their lives.

In the broadest sense, one's work determines the kind of life that one can expect to live. A sailor will be long away from home and must adjust to all weathers and strange lands; a pilot knows adventure and high income, but carries a heavy responsibility on every flight; a miner sees little of the sun; an office worker can wear nice clothes on the job but may have to sit at a desk all day; a construction worker gets a high hourly rate of pay but may have his income cut off by bad weather for weeks at a time; the factory worker's security is protected in many ways by his union, but some workers may find an assembly-line job monotonous, whereas others may find its pressures too great; a teacher usually has all summer off with the opportunity for study or travel, but rarely will he be able to build up a big bank account.

In considering choice of a job, therefore, the Nation's economic "life map" in the next decade becomes of vital importance to boys and girls now in high school and to those who will follow them through the 1960's. They will need

to know about trends in the Nation's work force and in its business, industrial, and occupational development, in order to evaluate satisfactorily where they can find their own best place. To help young people in this process, this section of the Handbook briefly describes what industries and occupations will be developing over the next decade.

No one can accurately forecast the future, but reasonable estimates, based on the best information available, are much better than pure speculation. Of course, some aspects of the future are easier to predict accurately than others. For example, the number of young people who will be 18 years old in 1970 can be estimated with a very high degree of accuracy, because these are the same individuals whom the Census counted as 8-year-olds in 1960. On the other hand, forecasting employment of automobile assemblers in 1970 is extremely difficult. The first estimate will be affected only by the death rate among boys and girls who will be 10 years old in 1962, and this extremely low rate stays about the same from year to year. Employment of automobile assemblers, however, will be affected by the changing demand for American-made automobiles, shifts in buyers' preferences (toward the "compact" car, for instance), changes in the way cars are made (more automation), and economic developments outside the automobile industry that are almost impossible to foresee. Nevertheless, we can make use of a wealth of available information and, by using the best judgment of informed experts, can describe, at least in broad terms, what the future world of work will be like.

Forecasts involve not only factual data but some basic assumptions, as well. Just as one cannot plan to go swimming at a certain time without assuming the weather will be warm enough, so economists cannot forecast the demand for certain kinds of workers without making specific assumptions about general eco-

conomic movements and broad national policy. The picture of the future as reflected in this Handbook is based on four fundamental assumptions:

(1) that high levels of economic activity and employment will be maintained over the long run, even though there may be temporary recessions;

(2) that there will be no major war but, at the same time, the defense program will continue at about the current level;

(3) that scientific and technological advances will continue;

(4) that the institutions and fundamental economic structure of the United States will not change significantly.

Starting with these assumptions and making use of detailed information collected from a great variety of sources during the preparation of this Handbook, the following sections provide answers to some questions of major importance to students who will begin work in the 1960's.

Some of these questions are: What kinds of jobs will there be? What industries will provide which kinds of jobs? What fields of work look especially promising? What competition will I face from other workers?

New ways of making things, new things to make, and new patterns of living are continually causing changes in the kinds of jobs that

are available to workers. When a boy leaves school today, he may be thinking in terms of jobs that have come into existence within the last 30 or 40 years, or even less—electronic technician, airplane mechanic, or radio repairman, for example. On the other hand, he may possibly never have heard of occupations such as cooper and wheelwright which, 50 years ago, were large and well-paid trades.

Awareness of the dynamic changes going on in our economy is particularly important for young people because the process of change is not suddenly going to grind to a halt. The young worker must be prepared to adjust to what will happen next in the world around him. It is therefore of great importance to him to get the broadest kind of training available when preparing for a particular occupation, so that if a shift in plans becomes necessary, transition from one field of work to another may be not only possible but smooth.

To throw light on the changing character of occupational life and to provide background for an understanding of the trends and outlook in particular occupations, the next few pages will review the growth and changing composition of the Nation's population as a whole and of that portion of the population that makes up the work force. The discussion will also tell something about the major trends in employment in broad industry and occupation groups.

## The Population and the People Who Work

### The Population

Work and jobs exist because there is a population to be served. The larger the population, the more needs there are to be met, hence more jobs. The changing age and other characteristics of the population will also affect to some extent the kinds of goods and services that will be needed, which in turn will influence the kinds of jobs that will develop.

The basic fact about our population is its enormous growth since the beginning of our life as an independent Nation. The first Census, in 1790, counted 4 million people occupying 889,000 square miles of territory, only half the population of New York City today. During

the first 150 years of our history, from 1790 to 1940, the population grew to 132 million people, occupying 3 million square miles.

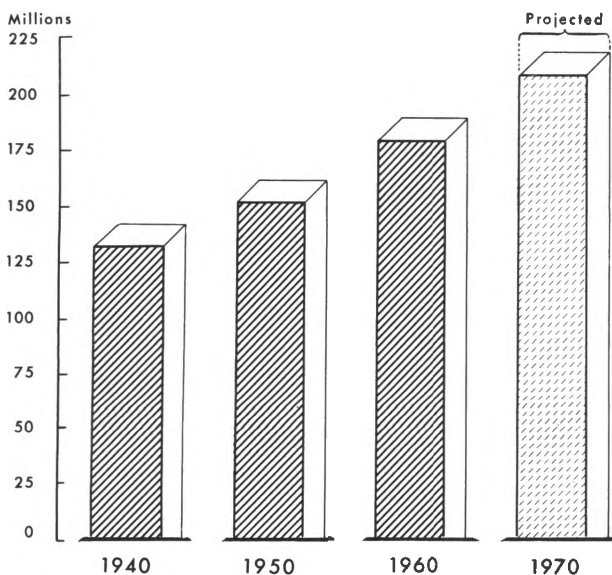
The growth in population was particularly rapid in the several decades preceding World War I, when there was a combination of a high birth rate, large-scale immigration from European countries, and a sharp reduction in death rates. After World War I, the rate of population increase slackened for two principal reasons—the birth rate declined and our immigration laws were so changed that the flow of people coming to the United States as immigrants virtually stopped. During the depression years of the 1930's, there was an especially

sharp decrease in marriages and therefore in births because of widespread unemployment, low incomes, and limited job opportunities. The low birth rates of the depression years are reflected clearly in the age distribution of the working population today, and will continue to result in a shortage of experienced, middle aged workers right through this decade.

Since most of the young people using this book were born after 1940, this discussion of population changes will concentrate on what has happened since the beginning of World War II. Chart 1 shows recent and anticipated population changes.

CHART 1

POPULATION WILL REACH 208 MILLION IN 1970 — 15 PERCENT MORE THAN IN 1960.....



Source: Data for 1940-60, U. S. Bureau of the Census; projections: U. S. Bureau of Labor Statistics.

During the war years, but particularly after 1945, when young veterans began to return home, the birth rate rose spectacularly. In 1947, 3.8 million births were recorded, compared with fewer than 2.5 million a year during the late 1930's. Since that time, the rate has remained high, with the number of births passing the 4 million mark in 1954 and continuing

to rise ever since. The 1960 Census counted 180 million people, almost 50 million more than only 20 years earlier; by 1970, the population is expected to reach a total of 208 million.

The presence of so many young people in the population has changed its age distribution considerably since 1940. For example, people under 14 then equaled 23 percent of the total population, but by 1960 this age group had risen to almost 30 percent, and will drop only a little (to 28 percent) between 1960 and 1970 (table 1). The population declines have been in the age groups which are the primary suppliers of experienced workers. In 1940, the broad age group from 25 to 44 was 30 percent of the total population; by 1960, it had dropped to 26 percent and by 1970, it will have dropped still further to 23 percent, almost the exact reverse of the changes that took place in the young group, over the same period of time. After 1970, of course, today's flood of young people will again be changing the proportion of those aged 25-44 in the total population.

TABLE 1. Percent distribution of population by age, 1940-70

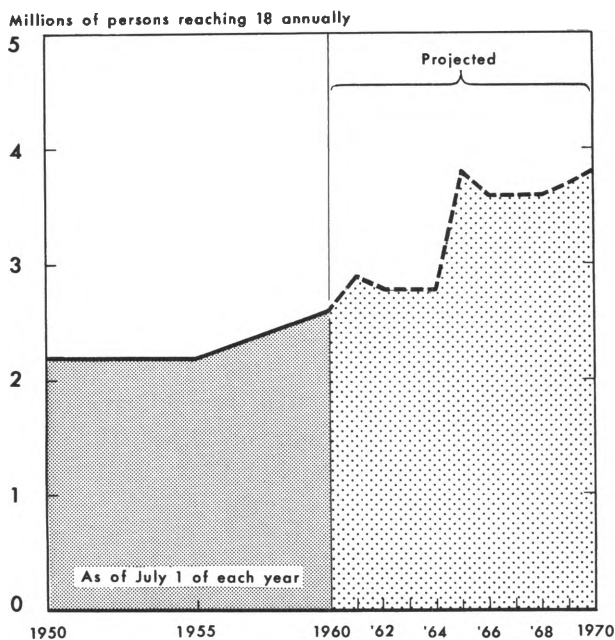
Age	1940	1950	1955	1960	1965	1970
Total population.....	100.0	100.0	100.0	100.0	100.0	100.0
Under 14 years.....	23.1	25.4	28.1	29.6	28.7	27.6
14-19 years.....	11.2	8.5	8.2	9.0	10.8	11.2
20-24 years.....	9.9	7.7	6.5	6.3	7.0	8.3
25-34 years.....	16.2	15.8	14.6	12.7	11.6	12.1
35-44 years.....	13.9	14.2	13.8	13.3	12.6	11.1
45-54 years.....	11.8	11.5	11.4	11.6	11.4	11.2
55-64 years.....	8.1	8.8	8.8	8.7	8.8	9.1
65 years and over.....	6.8	8.1	8.6	8.8	9.1	9.4

SOURCE: U.S. Department of Commerce, Bureau of the Census, Current Population Reports, Series P-25, No. 98 and Series P-25, No. 187.

Of most immediate significance to young people now making their occupational plans is the number who will be reaching age 18 during the present decade. To look back for a moment, in 1955 young people reaching their 18th birthday totaled only 2.2 million. In 1960, those becoming 18 totaled 2.6 million, but by 1965 they will number 3.8 million. With only slight variation each year, their number will remain at approximately that level through 1970. These are the post-World War II babies growing up, and their numbers are a measure of the competition for college education or other advanced

CHART 2

**NUMBER OF 18-YEAR-OLDS WILL INCREASE RAPIDLY DURING THE 1960'S.....**



Source: U.S. Bureau of the Census.

training and for jobs that every 18-year-old will have to face. (See chart 2).

For the majority of young people, age 18 is a crucial turning point. It is the age at which most of them graduate from high school, if they do graduate, and either go on to further education or training or start to work on a full-time basis. Some may decide on full-time work and part-time school or on full-time school and part-time work. Many girls will decide to marry. Whatever the specific decision, it will be, for most young people, as vital a one as they will ever make—often a point of no return.

### The People Who Work

Statisticians often use terms whose meanings are not obvious and need to be explained. One of these terms, which is used frequently in the Handbook, is "labor force." This group of people is only a part of the total population. First, no one under 14 years of age is counted in this group because child labor and school

attendance laws generally make it illegal for children under this age to hold jobs. Among persons 14 and over only two groups are counted as being in the labor force: (1) Persons who work, either as full-time or part-time employees (including those in the Armed Forces) or as self-employed; and (2) persons who are unemployed and actively looking for work.

During the 1960's, the labor force will grow even faster than the population as a whole, mainly because of the large number of young people reaching working age. From 73½ million in 1960 the labor force is expected to grow, by 1970, to over 87 million, an increase of 13½ million or close to 20 percent. At the same time, the population will grow only 15 percent. This 13½ million is, of course, only the *net* increase over this period. The total number of new workers entering the labor force will far exceed this figure. Those under 25, alone, will equal 26 million in the decade and larger proportions of older women entering or reentering the labor force will augment this number to 29 million. The difference of 15½ million between this total and the net growth of 13½ million represents persons absorbed into the labor force as replacements for those workers who, during the same 10 years, will have died, retired, or left for other reasons, such as disability or, among women, for marriage or to take care of children.

The anticipated changes in the size and age distribution of the work force are shown in table 2. Those under 25 will total almost half the increase between 1960 and 1970, and their overall proportion in the labor force will rise from less than 19 to more than 23 percent. Workers over 45 will contribute the second largest increase in numbers, but their proportion in the total work force will rise only a little. Those between 35 and 44, always considered a key age group in the experienced work force, will not only decline in numbers but will drop from second to fourth (and lowest) place proportionately among all workers.

Thus, the first notable characteristic of the work force in the 1960's will be the presence of much larger numbers of young people than in the past, despite the fact that higher pro-

portions of youth are remaining in school longer. This is the result of their sheer numbers. Second will be the ever greater role of women workers. For example, of the total net increase of 13½ million in the labor force, almost half will be women. Young girls just finishing school and planning for their future should therefore take a good look at the changing pattern of women's working lives in the United States, which these labor force figures dramatize so vividly.

TABLE 2. Changes in the number and age distribution of people in the labor force, 1960-70

Age group	Number in labor force		Proportion in labor force		Change 1960 to 1970	
	1960 (millions)	1970 (millions)	1960 (percent)	1970 (percent)	(Millions)	(Percent)
All workers.....	73.6	87.1	100.0	100.0	+13.5	+18.3
Under 25 years.....	13.8	20.2	18.7	23.2	+6.4	+46.0
25-34 years.....	15.3	17.1	20.8	19.6	+1.8	+12.0
35-44 years.....	16.6	16.4	22.6	18.8	-0.2	-1.0
45 years and older.....	27.9	33.4	37.9	38.4	+5.5	+20.0

Based on studies by the Bureau of Labor Statistics, most girls can expect the following life pattern as they move from school to middle and old age. Most unmarried girls will go to work at age 17 or 18 (unless they go to college). Within 3 or 4 years, most of these girls will marry. Some of them will then stop working for pay in order to get a new home organized, but a majority will continue to work, either to help put a husband through school, to supplement a husband's income, or to permit purchase of a home, a car, or the laborsaving equipment that modern industry produces in such abundance. Then, when the first baby arrives, the vast majority of young mothers give up their

jobs and remain out of the labor market until their youngest child is old enough to go to school. It is true that as many as one in seven women with preschool-age children do continue to work, usually because of economic necessity, but the general pattern is that the age group 25-34 supplies the lowest proportion of women workers.

When the youngest child no longer needs constant care, the trek of mothers back to paid employment begins. This usually happens when the women are approaching their middle thirties, after they have been nonwage earners for about 8 to 10 years. Once back, the tendency is for them to remain in the labor force, perhaps not continuously, but certainly for a substantial proportion of their years to age 65. By 1970, nearly half of all women between 35 and 65 will probably be either working or looking for work. Unless things change radically and unexpectedly in the years ahead, the highest participation rate will be among women aged 45 to 54.

These comments have concentrated on the life pattern of married women because they will be in the vast majority. But for the girl who remains single—and 1 in 10 does—the length of her working life will be little different from that of a man. Since most single women must support themselves, and often parents or other relatives, they must continue to hold a job. The "work-life expectancy," as it is often referred to, looks like this for women: For single women, 40 years at work; for childless married women, 31 years, and for married women with children, 27 years. It therefore behooves girls, as well as boys, to give serious thought to the kind of work they want to do and can do best.

## The Kinds of Jobs There Will Be

What can young people anticipate about the kinds of jobs that will be available? In what industries will the jobs be found? Just as the size of our work force has changed sharply over the years, so has the size and character of major industries, and these changes greatly affect employment opportunities and occupational choice. Some industries which flourished

at the turn of the century are all but gone; others unknown 50 years ago are now among the largest employers. Two dramatic examples of the new industries are aircraft and chemicals. But even these are now old, compared with those in the atomic energy field and in the production and servicing of electronic equipment. There is little doubt that there are in-

dustries and occupations which are so small right now as to be hardly noticeable but which will, one day, become major fields of employment.

### Changes in Important Industries

Most people, when thinking about what they want to do for a living, think in terms of a specific occupation such as secretary, airplane mechanic, clerk, doctor, machinist, truck-driver, or carpenter, rather than in terms of industrial activities such as manufacturing, retail trade, or construction. This being the case, it might seem more logical to discuss the trends in major groups of occupations first rather than trends in major industries. Although it is true that the occupation *is* of primary interest, the same occupation often exists in so many different industries that the individual can better visualize the broader opportunities if he first finds out something about industry trends. Knowing these trends, he can then decide not only on the occupation to train for, but what industries offer the best possibilities for using that occupational training.

### Farming

The terms "technology" and "mechanization" bring to mind images of great auto assembly plants or oil refineries or an army of robots doing man's work. Actually, however, the greatest technological revolution in the United States has taken place on the farm. In 1870, more than half of the Nation's workers were engaged in agriculture. Today, only 1 worker in 12 makes his living from farming, either as a farm owner or as a laborer. The implications of this fact are enormous. Ninety years ago, the average farmer could supply food for only about 6 people; in 1960, 1 farmer met the food needs of 26 people.

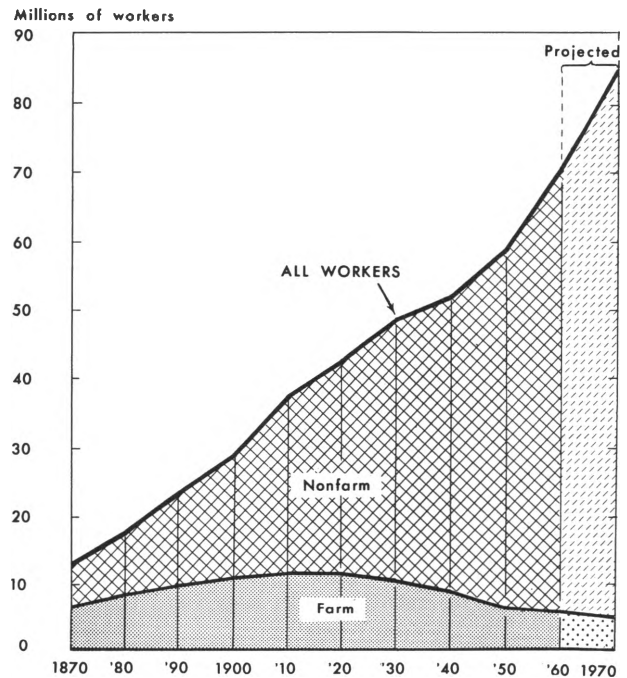
By comparing a farm of 1870 with one of today, we can readily see why this has been possible. Today's farmer has machinery which enables him to put into use several times the acreage that a man could handle in 1870. This has contributed to the great growth in size of individual farms. Moreover, the replacement

of horses and mules by tractors and trucks in both the city and on the farm has freed millions of acres for the production of food for human beings instead of for livestock. The use of scientific methods, chemicals, fertilizers, better seeds, and improved cattle and hogs have also greatly increased farm productivity.

The results of this technological revolution are shown in chart 3. The number of farmers

CHART 3

### MORE WORKERS IN BUSINESS AND INDUSTRY — FEWER ON FARMS.....



Source: Data for 1870-1960, U.S. Bureau of the Census, projections: U.S. Bureau of Labor Statistics.

and farm workers increased from about 7 million (53 percent of the labor force) in 1870 to a peak of 11½ million around 1910. By 1950, the number of farm workers had declined to 7 million (12 percent of the labor force), the same number as 80 years before, even though the Nation's population had increased almost fourfold and the quantity of farm products, by 4½ times.

This downward trend in the number of farm workers continued during the 1950-60 decade. In 1960, only 5.9 million farmers and farm

laborers were in the labor force; by 1970, the total will have dropped still further, to about 5 million, only 6 percent of the labor force—a ninefold drop in 100 years. In view of this continuing decline, the young man who has been dreaming of making a living by operating his own small family acreage may want to consider training for something else. Many scientific and professional occupations and specialized services associated with agriculture are developing rapidly and offer greater economic promise than farming on a small scale.

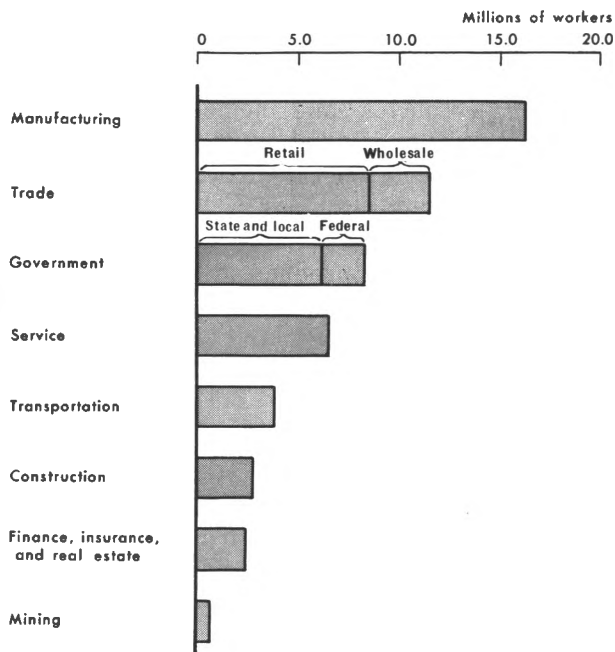
**Nonfarm Industries**

Most workers are employed in industries other than farming; in fact, more than 90 percent now earn their living in one of the following major types of activity: Mining, manufacturing, construction, transportation and public utilities, trade, finance, service, and government. These are broad designations referred to as “industry groups” by the Census and other agencies that collect information on employment. (See chart 4.) Each of these groups includes a variety of individual industries, and in each industry there are many different kinds of jobs. One should not think of “trade,” for example, only in terms of clerks selling things over the counter, or of “manufacturing” as offering only jobs on an assembly line, or of “service” as being mainly waiting on tables in a restaurant or pressing a suit in a dry cleaning shop.

The number and kind of jobs in any specific industry will depend on whether the industry is growing or declining, and what kind of processes and machines it uses to carry out its work. Actually, a young person making his work choice will be most interested in whether employment in an industry is increasing or decreasing, and whether there is a shortage or surplus of workers to perform the tasks in that particular industry.

We can get some idea of how the eight major industry groups have been changing in the past 40 years by looking at some figures which the Bureau of Labor Statistics has been collecting directly from employers over all that time. First, the total number of employees in all eight

CHART 4  
EMPLOYMENT IN EIGHT MAJOR INDUSTRY GROUPS, 1960....



groups has exactly doubled, and in 1960 totaled about 53 million. But the same amount of growth did not occur in each of the eight groups. Employment in transportation and public utilities, for example, hardly grew at all, despite the tremendous jump in air and bus travel. Jobs in mining are now only three-fifths as many as at the end of World War I. On the other hand, the service industries, government employment, construction, and wholesale and retail trade grew with the greatest rapidity. Employment in the services and in government are now both more than threefold what they were in 1919, followed by construction (2.7 times) and wholesale and retail trade, 2.5 times. Employment in manufacturing, while continuing to grow, grew more slowly, increasing by 1960 to only 1½ times its 1919 total. A closer look at some aspects of each broad industry group will help to show what each has to offer in terms of employment prospects.

Although *manufacturing* as a whole has not grown at as fast a rate as some others, it still

employs many more people than any of the other seven industry groups. In 1960, more than 16 million people earned their living in the multitude of occupations found in this very diversified segment of the economy. "Operative" jobs, the biggest group in manufacturing, provide work for about 45 percent of all manufacturing employees and include three or four main types of semiskilled workers:

(1) those who operate machines or equipment used in making things;

(2) those who assemble various parts to make a single final product such as a radio or television set;

(3) those who inspect and test the product to see that it is made properly and will work satisfactorily;

(4) those who serve as helpers to more skilled workers—such as the stationary fireman who helps the skilled stationary engineer run and repair the steam boilers in a plant.

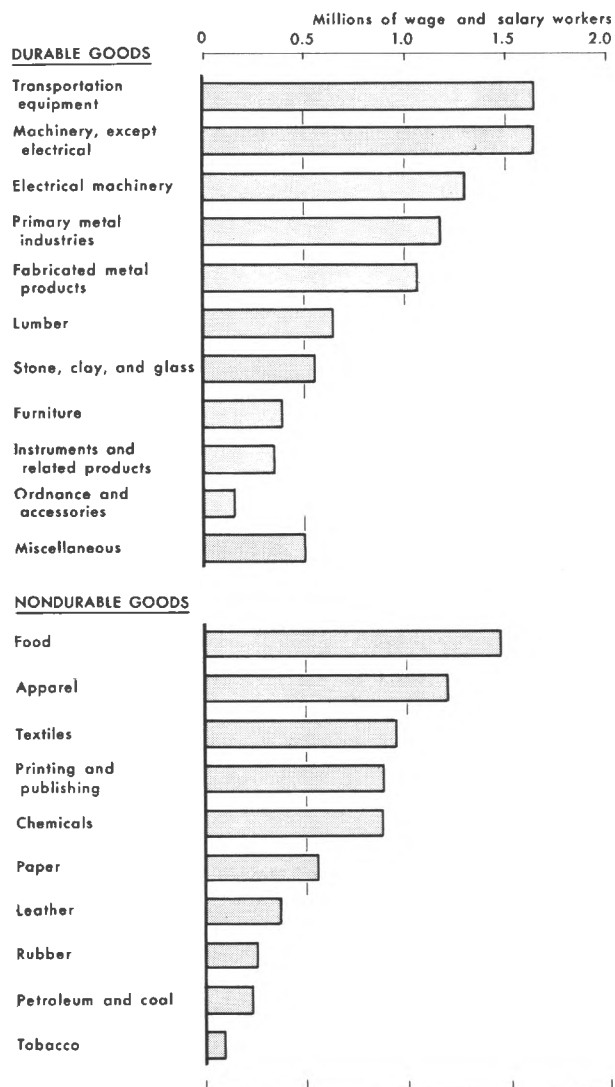
There are many other kinds of jobs in manufacturing besides operatives—machinists, engineers, stenographers, production managers, tool and die makers, traveling salesmen, and unskilled laborers, to name a few.

The number of people employed in the different branches of manufacturing are shown in chart 5. The industries making durable goods (things that last a long time), such as machinery, refrigerators, and automobiles, employed a total of almost 9½ million people in 1960. The nondurable-goods manufacturers, who process food, make clothing, print newspapers, and produce many other things that are used up quickly, employed almost 7 million people. Employment in the durable-goods branch was highest in those industries producing machinery and transportation equipment (autos, aircraft, and railway cars) and was lowest in industries making such specialized items as instruments and ordnance (things like guns and ammunition). Employment in the nondurable-goods branch was highest in food and clothing, and the fewest workers were employed in making cigarettes and other tobacco products.

The second biggest industry group in 1960 was *retail and wholesale trade*, employing 12 million people, about three-fourths of them in

CHART 5

## EMPLOYMENT IN MAJOR BRANCHES OF MANUFACTURING, 1960.....



the retail branch. Although various kinds of sales jobs make up the largest group of these employees, the industry also has jobs for large numbers of clerical workers, truckdrivers, delivery men, elevator operators, porters, packagers, and often repair services of various kinds. In the past 40 years, wholesale and retail trade has been a "growth" industry—its present employment being 2½ times the 1919 level. One of its significant features is the fact that it employs high proportions of women on both full-time and part-time jobs, principally retail



selling, and is one of the principal "absorbers" of middle-aged and older women who are re-entering the labor force.

In 1960, *government* was the third largest employer, with 8½ million workers. Three-fourths of these workers were State and local employees, such as teachers, policemen, firemen, sanitation workers, and welfare workers. As the population continues to rise, the need for more and more of such workers will increase and will continue the long-range upward trend that has been apparent since 1919. The 6 million people who were working for State and local governments in 1960 were three times the number so employed 40 years earlier. Federal employment, which rises to higher levels in times of war, has been stabilized at close to 2 million since the end of the Korean fighting. As in other industries, there is considerable turnover in the Federal service and the government often finds it necessary to put on special recruitment programs for young professional and clerical workers.

In 1960, the *service industries* stood in fourth rank among employers, providing jobs for more than 6½ million people. These millions were working in such diverse places as auto and other kinds of repair shops, laundries, dry cleaning establishments, hotels, barber shops, theaters, movie production, advertising firms, and a host of others. The service industry group has also been one of the fastest growing and is now well over three times its size in 1919. This reflects a very important fact about our way of life—that as we grow and prosper, higher and higher proportions of people will be engaged, not in making things, but in performing the multitude of services that make life more pleasant and easier for people generally.

The remaining four of the eight major industry groups employed far fewer people in 1960, less than 10 million all together. The largest of the four was *transportation* (trains, buses, airplanes, ships), *communications and public utilities* (telephone, telegraph, electric light and power) with a total of almost 4 million workers. Despite the many new activities in this general area and all the new inventions involved, this group is one of the slowest growing in overall employment, with only a 5-percent

increase in the past 40 years. This reflects the great decline in railroad employment, owing to mechanization, competition from other forms of public transportation, from the use of private automobiles, and the increasing mechanization in many other branches of the industry group. A vivid example is telephones. In 1921, when the automatic dial system was introduced, 118,500 operators handled 1⅓ billion calls a month. If, since that time, there had been no increase in the use of dial equipment and no change in productivity, over 750,000 operators would now be needed instead of the approximately 225,000 currently employed. Continuing technological improvements will undoubtedly enable the telephone industry to expand its service as needed without expanding employment of operators. Nevertheless, there is a very high turnover in this occupation, since it employs mainly young girls of marriageable age, and the job opportunities here for women are comparatively good. In the transportation branch of this industry group most employees are men.

The *contract construction industry* includes the building of such structures as homes, factories, schools, public buildings, office buildings, apartment houses, roads, bridges, and dams. In the past 40 years, employment in this industry has almost tripled, reflecting again the rapid growth of the Nation's population and industries. In 1960, this industry employed 2.8 million people (almost all of them men), half of them skilled craftsmen. Employment in construction fluctuates greatly, from one season to another and also from year to year, reacting to business activity generally. When business conditions are good, people buy new homes and companies invest in new plants; when business is slack, businessmen and private citizens both tend to put off this kind of spending. Every year, when the weather turns bad, outdoor work stops. Sometimes, as during a war, resources of material and skills go into construction of camps, defense plants, and ships, and private building may almost cease. This happened during World War II, but after 1947, the accumulated, unfilled civilian demand of 7 years boosted construction employment by 40 percent to its present level. Maximum employment in

any single year of the past decade, however, was in 1956 when it reached 2.9 million.

Employment in the *finance, insurance, and real estate* group was almost as great as in construction in 1960—2.5 million, more than  $2\frac{1}{3}$  times the 1919 figures. Here again is an industry which, although not one of the largest, is a rapidly growing one. Some of its growth has a direct relation to the building of new homes, and the phenomenal increase since the depression of the 1930's in instalment buying and credit facilities has contributed to its expansion. In contrast to construction, most of the jobs are white-collar ones, and almost half the employees are women.

Other than agriculture, *mining* is the one industry group where a decline in jobs has persisted over many years. Employment was 665,000 in 1960, only 60 percent of the 1919 figure, despite the fact that the industry group includes petroleum and natural gas production where the number of jobs has grown 40 percent in the past 10 years alone. However, the silent, abandoned coal mines that scar so much of West Virginia, Illinois, Kentucky, and western Pennsylvania are mute evidence of rapid decline in this industry whose deep pits once produced the fuel that fed the furnaces of American industry.

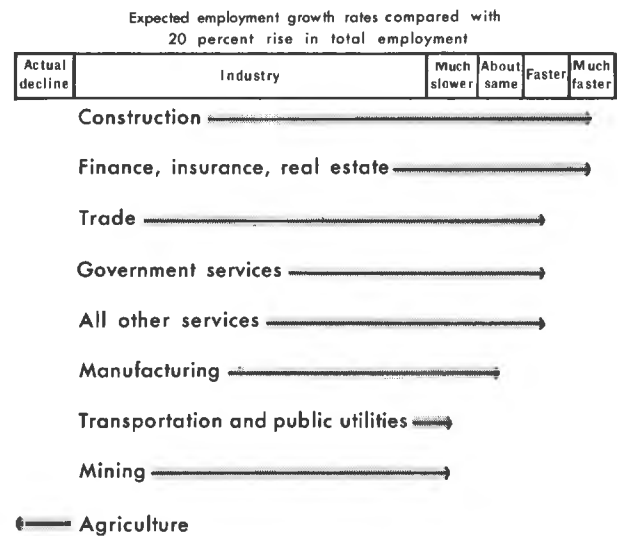
### The Industrial Forecast

The preceding paragraphs tell where American industry stood in 1960. They describe what has happened over a period of years and illustrate the point that changes occur at varying speeds and often go in different directions. What is perhaps more important for those about to choose a career, however, is "What can be expected to happen next?" What industries will employ the expected increase of  $13\frac{1}{2}$  million workers in the next 10 years? This is where projections come in—forecasts based on the best available information. (See chart 6.)

How do the employment prospects for individual industry groups compare with the expected overall employment growth of 20 percent? Two groups, *construction* and *finance*, though not among the largest employers, will grow far more rapidly than the average, with

CHART 6

### INDUSTRIES WILL VARY WIDELY IN THEIR RATE OF GROWTH DURING THE 1960'S....



employment gains of 30 percent or more. The millions of young families expected to be formed, especially after 1965, will push upward the demand for more homes, more school rooms, more highways, more stores, more facilities of all kinds. The construction industry will boom. Accompanying it in rate of growth will be the *finance, insurance, and real estate* group. Contributing to this growth will be generally rising income levels, the increasing complexity of the country's financial activities, the growth of industries with insurance and financial needs, and the continuing flow of population from farms to urban areas.

Greater than average employment increases, but less than those in construction and finance, will occur in *retail and other branches of trade*, and in *government*, chiefly in the services provided by State and local units, such as public education, health, sanitation and welfare, and in other professional, business, recreational and personal services. In both these broad groups, increases between 25 and 29 percent are expected.

The largest employer, *manufacturing*, will grow at about the same rate as all groups combined—20 percent. However, some of its branches will grow much faster than others. In general, the shift in employment from non-

urable to durable goods industries is expected to continue, even though variations in this trend also occur from year to year. Accelerated mechanization, which is difficult to predict, may belie this forecast to a certain extent.

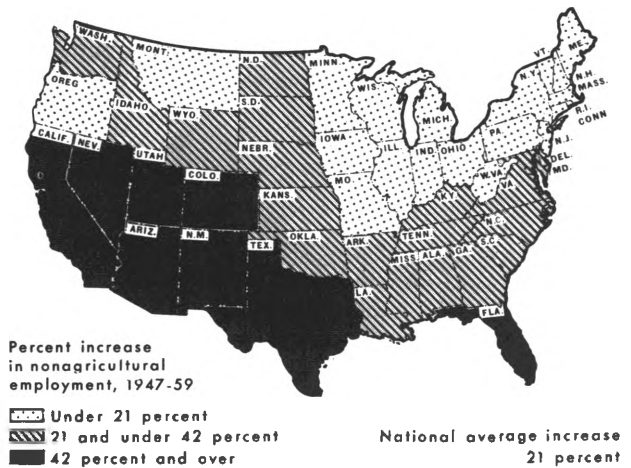
Rising less than the average will be two other groups—*transportation, communications, and public utilities, and mining.* As in manufacturing, some segments of this industry group will expand rapidly but these gains will be offset by employment declines in others. The contributing factors already mentioned in trends to 1960 will continue to influence the overall situation.

Finally, *agricultural employment* is expected to decline substantially, releasing thousands of workers to be absorbed elsewhere. Nevertheless, the professional and technical jobs connected with agriculture, such as those of agricultural research specialist, soil scientist, and soil conservationist will actually grow.

Before leaving the subject of industry growth and change, one more factor should be mentioned, i.e., that the changes discussed above will not be spread evenly over all areas of the country. Although nonfarm employment between 1947 and 1959 increased in all States except Rhode Island, West Virginia, and Pennsylvania, the rate of growth has been quite different in various parts of the country. (See chart 7.) Nationally, employment grew 21 percent between 1947 and 1959, but in California, the Rocky Mountain area, the Southwest, and Florida, employment growth was twice or more than twice the national average. Aircraft, electronics, and tourism account for much of this growth. The Southeastern States, long slow in industrial development, have been growing faster than the national average, but not as fast as the West and Southwest. Employment growth in the Southeast has been between 21 and 42 percent. On the other hand, in New England, the Middle Atlantic, and East North Central States, employment has increased less than the national average.

CHART 7

EMPLOYMENT IS INCREASING MOST RAPIDLY IN WESTERN AND SOUTHERN STATES.....

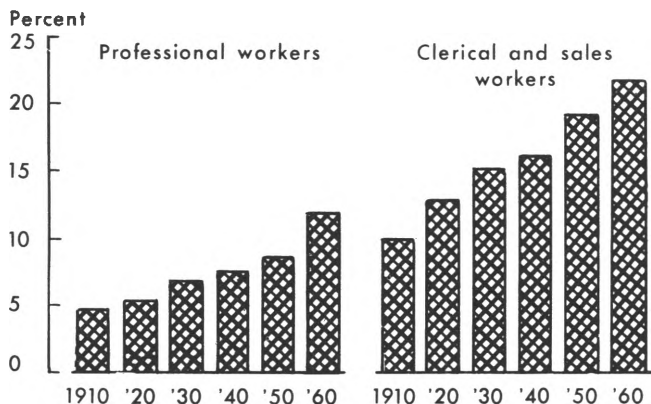


In spite of these shifts, the geographic concentration of industry and commerce remains substantially in the areas where it was at the end of World War II. Even though in one of the fastest growing areas, the Pacific and Mountain States, manufacturing jobs have increased by 60 percent since 1947, 60 percent of all manufacturing jobs are still found in the New England, Middle Atlantic, and East North Central States, compared with 67 percent in 1947. These three regions also still provide half the jobs in trade, finance, service, and transportation, and more than 40 percent of those in construction and government—a decline of no more than 3 percentage points in any of these categories over the 12 intervening years. Only in the extractive industries has the concentration of employment definitely shifted—from the coal producing areas of the Middle Atlantic to the petroleum and gas producing States of Texas, Louisiana, and Oklahoma. This reflects not so much the migration of an industry, however, as a revolution in the type of natural resources being used.

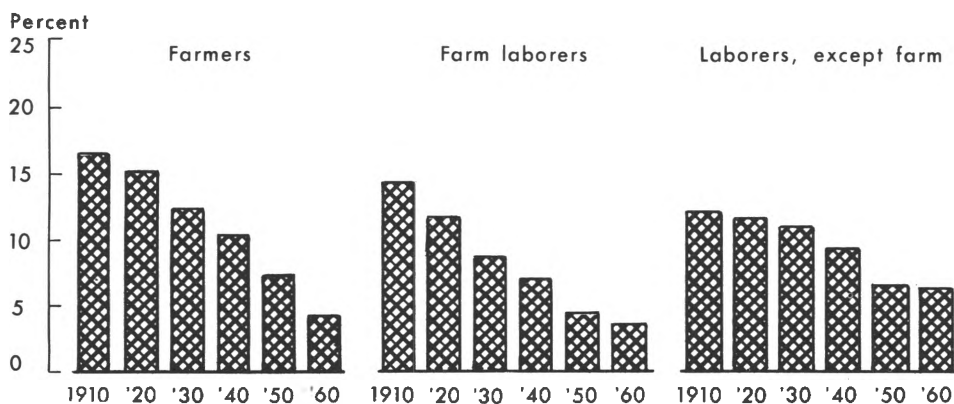
CHART 8

PROPORTION OF EXPERIENCED LABOR FORCE IN EACH OCCUPATIONAL GROUP.....  
1910-60

Professional, clerical, and sales occupations have grown most rapidly



Farm and unskilled occupations have lost ground



Others have shown no consistent trend



Source: Data for 1910-50, U.S. Bureau of the Census; data for 1960, estimated by U.S. Bureau of Labor Statistics.

# The Outlook For Occupational Change

Changes in industries, which are the suppliers of jobs, have been accompanied by changes in the nature of occupations and the numbers of people employed in them. These changes have been going on for many decades in every major occupational group. Some groups of occupations have been growing rapidly, others declining, and still others rising or falling from one decade to the next without consistent pattern. The professional and other white-collar occupations have grown fastest over the past 50 years; farm owners and farm laborers have declined most rapidly. Some groups, the skilled, semiskilled, and service workers, have fluctuated, with net gains of about 20 percent or slightly more over the half century. Chart 8 shows the changing proportions of each of these groups in the experienced work force, since 1910.

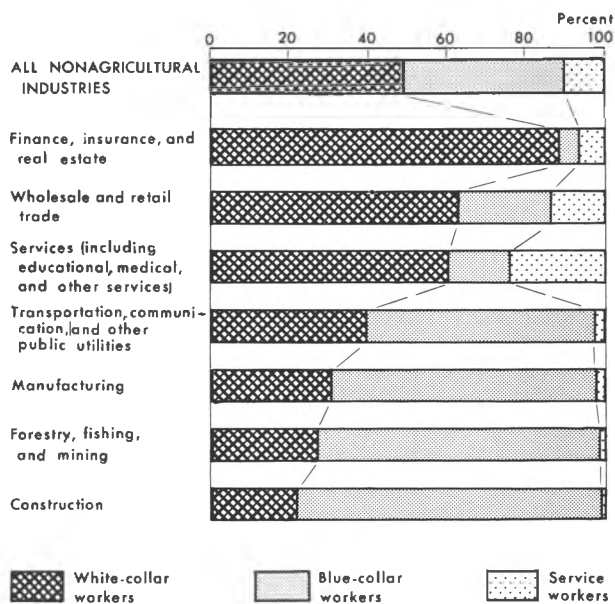
Probably the most significant overall change in the Nation's occupational structure has been the shift toward white-collar jobs. In 1956, for the first time in the Nation's history, professional, managerial, office and sales workers outnumbered craftsmen, operatives, and laborers. The startling import of this continuing trend can be fully realized only when we remember that in 1910 the number of white-collar jobs was less than half the blue-collar jobs; now, they have left the blue collars behind, and by 1970 they will be 25 percent greater than blue collars. Expressed somewhat differently, white-collar workers in 1910 were 22 percent of the labor force; by 1960, they had reached 42 percent.

One of the more interesting illustrations of this shift has occurred in the postwar period in manufacturing, the chief industrial employer of manual workers. Between 1948 and 1960, the number of production workers *declined* by nearly a half million, while at the same time, nonproduction workers, mainly in the white-collar occupations, *increased* by 1½ million.

Chart 9 shows the proportions of white-collar, blue-collar, and service workers in each major industry group in 1960. Much of the overall growth in the white-collar group reflects the Nation's technological advancement, the shift from a predominantly agricultural economy to

CHART 9

PROPORTION OF WHITE-COLLAR, BLUE-COLLAR, AND SERVICE WORKERS IN SEVEN MAJOR INDUSTRY GROUPS, 1960.....



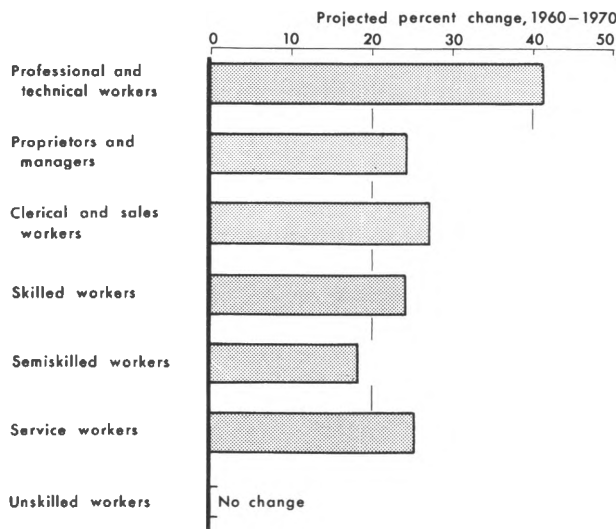
a predominantly industrial economy, the growing needs of a growing population for educational and medical services, the increasing size and complexity of business organizations, and the accelerating tendency in all types of enterprises for more research and more record-keeping.

Chart 10 projects the changes that are expected to take place between 1960 and 1970 in the major nonfarm occupational groups. In developing these projections, many things were taken into account: the expected increase in the size of the labor force, the changing demands of the population for various goods and services, the changing occupational requirements of each industry, and continuing changes in technology, as well as the industrial developments discussed in the preceding section.

Chart 10 shows which occupations will grow faster than the expected average increase of 20 percent for all employment. The vertical line at the 20-percent point permits a quick grasp of the relationship of one occupational group to another. All the growing occupations except the semiskilled workers will exceed the average increase, whereas the proportion of

CHART 10

PROFESSIONAL, CLERICAL, AND SERVICE OCCUPATIONS  
ARE THE FASTEST GROWING.....



unskilled workers is not expected to change at all.

### White-Collar Jobs

Within the white-collar group, there are variations in rate of growth, just as in major industry groups. Professional and technical personnel, the most highly educated of all workers, are increasing the fastest. In 1950, almost 5 million persons were employed in professional and technical occupations; by 1960, their total had reached 7½ million and by 1970 will exceed 10 million, a rise in 20 years from 8 percent to well over 12½ percent of total employment. Much of this increase has been in the scientific and engineering professions, reflecting rapid advances in electronics, jet aircraft, guided missiles, chemicals, and communications. This growth in employment is not confined to the top-flight professionals, however. Technicians, who assist these specialists, now number 700,000 and are increasing in number even faster than the engineers and scientists. Together, these 2 million well-trained workers are developing the newest type of economic activity in the country, aptly named "the industry of discovery"—the pursuit of new inventions, new techniques, new materials, and new weapons. These developments, plus an ever increasing de-

mand for both public school and college teachers, and medical and other health specialists will result in a rate of growth in the professional group about twice that of the labor force as a whole.

Today's numerically largest white-collar occupation, the clerical workers (close to 10 million), have grown at a faster rate than any other except the professional group. Between 1950 and 1960, the number of clerical workers grew over 30 percent; in the next 10 years, a further increase of 26 percent is expected. This growth has occurred in spite of the introduction of laborsaving office machines and more efficient management methods. The supply of typists, stenographers, secretaries, and other office workers never seems to catch up with the demand. Girls graduating from high school with skills in these "commercial arts" almost certainly will find jobs waiting for them. The more complex a society becomes, the greater its need for records and communications, not only to keep modern business operating, but to provide the expanded tax and other reports required by government. Since no end is in sight to the accelerating complexity of modern society, the need for clerical workers will continue to grow over the long run, although possibly at a somewhat slower pace, as the laborsaving effects of improved office machines and equipment become more general. Even so, the development and operation of these machines will create some new, more highly skilled jobs than the clerical tasks with which we are now so familiar.

The third largest group of white-collar workers is the managerial group, consisting mainly of owners of small enterprises and salaried officials in both private businesses and government agencies. This group in 1960 numbered 7 million. The proportion of these workers in the total labor force, however, is relatively static, despite their increase in numbers. The noticeable replacement of small groceries, general stores, hand laundries, often run as a family business, by supermarkets and big chains is cutting into the number of proprietors. On the other hand, salaried managerial positions, with their demand for better education and training, are increasing rapidly. Even though

the managerial group as a whole is not showing the same growth as some other white-collar occupations, its numbers are expected to increase more than 20 percent by 1970.

Among the white-collar occupations, the smallest numerically (less than 4½ million) is the sales group, but it is expected to increase at a somewhat faster rate than the labor force as a whole. Except for some specialized sales personnel, this is the white-collar group that requires less extensive training. One of its great advantages is that it can and does absorb considerable numbers of older women, many of them on a part-time basis. Although such mechanical devices as vending machines, and the increasing availability of self-service in groceries and variety stores will probably act as brakes in the growth of retail sales employment, nevertheless, as the population grows, steady, long-run increases are expected.

#### **Blue-Collar Jobs**

The most highly trained workers in this group, and the highest earners as well, are craftsmen and foremen sometimes referred to, in more general terms, as "skilled workers." Examples of skilled workers are carpenters, plumbers, electricians, and all the other skilled building trades workers who make possible not only our convenient and efficient homes and offices, but also our roads, bridges, harbors, and airfields. Then there are the skilled metalworkers (such as machinists, tool and die makers, and molders) who read the blue prints, and prepare models, dies, and tools from which production machines and instruments are made. Before the factory operative can turn out his product on his machine, the machine itself must be manufactured; the construction of this machine from engineering designs is the responsibility of the skilled metalworking craftsman. Another important group are the mechanics and repairmen, who keep automobiles and factory machinery in running order, fix radios and television sets, maintain airplanes in safe flying condition, and do all manner of other repair work that helps our machine-based society to run smoothly. Included also among the skilled workers are the foremen, who direct the work of others, and in many cases also do

skilled work themselves. All together, this group totaled 8½ million workers in 1960 and will grow 25 percent during the decade.

The importance of the skilled worker has been shadowed to some extent in recent years because of the attention which has been concentrated on professional workers, notably scientists and engineers and teachers. This is shortsighted, because the work of the scientist and engineer would be barren were there no skilled workers to give it form and substance.

Different industries employ quite different proportions of craftsmen. Manufacturing employs a greater number than any other industry (3.2 million). In construction, however, these skilled workers are a much higher proportion of employees than in any other industry group—1 out of every 2, compared with 1 in 5 in manufacturing and in transportation, and fewer than 1 in 10 in other industries. The young man who prepares himself, through apprenticeship or otherwise, for one of the skilled occupations can therefore anticipate pretty well where his greatest job opportunities are apt to be. Another point to remember is that certain occupations within the skilled worker group have grown and will grow faster than others, as is true of so many other aspects of the economy. Mechanics and repairmen of all kinds have increased the fastest during the first half century, from 300,000 to 2½ million. Some once-preeminent skilled occupations, such as blacksmiths, and shoemakers and shoe repairmen, total only 40,000 and 60,000 respectively among today's 8½ million skilled workers.

In 1960, the age group 25–44 supplied half of all the skilled workers. But with this broad age group growing very little in the present decade and the number of 35 to 44-year-olds actually declining, the opportunities in the skilled trades should be bright indeed for workers under 25, *provided* that they plan for and carry through on the necessary training. Awareness of the magnitude of the opportunity becomes sharper, perhaps, if we count up the total number of new skilled workers who will need to be trained in the next 10 years to keep the economy functioning. First, 2½ million *more* skilled workers will be needed in 1970 than in 1960, and in addition, replacements will need

to be found for another 2,700,000 who in these 10 years will transfer, for one reason or another, to other occupations, or who will retire or die. The economy will therefore be looking for 5 million able young men to apply their intelligence and skills to produce machines, to build homes and highways, and to keep things running efficiently. The whole burgeoning field of atomic development presents an even greater challenge, because it will need more and more highly trained craftsmen with skills adequate to keep the new industrial revolution moving ahead.

Next to the skilled workers in importance, within the blue-collar group, are the semiskilled workers. The most numerous of all major occupational groups, they find jobs in almost every major industry. In 1960, they totaled about 12 million and were 18 percent of the employed work force. This was a drop, however, from 20 percent in 1950, and indicates the way the wind blows for such workers. Prospects for 1970 are that the group will probably maintain its present relative position, with an increase in numbers to something over 14½ million, but it will not share the growth rate either of the skilled worker or of some white-collar groups. Changing technology which, in the early part of the century, created so many new jobs through mechanization of manufacturing processes and thereby the development of giant mass-production industries, shows signs, in the future, of braking the growth of semiskilled jobs, at least in manufacturing. Newly found ways of getting machines to do the work of men, popularly known as "automation," permit larger output without a corresponding increase in semiskilled machine operators. The automobile industry is a prime example of this recent kind of change. On the other hand, the increasing use of trucks, buses, and motor vehicles, for both human and freight transport, will continue to create a demand for truck and bus drivers, who are also classified as semiskilled workers.

The third main group among blue-collar workers are the laborers, who follow such vocations as deckhand, street cleaner, ditch digger, and carnival roustabout. The least skilled of all workers, they do the hardest physical work,

except perhaps farm laborers, and usually are the lowest paid. Over the past half century their place in the labor force has dropped from 12½ percent to less than 6 percent in 1960. In numbers, the need for unskilled workers will remain about the same during the decade, but their proportion in the labor force will continue to drop—to less than 5 percent by 1970. Even in some of these hard, laborious tasks, growing mechanization will displace much of the physical labor that was once so crucial to industrial production.

A growing occupational group called "service workers" offers a great variety of job opportunities ranging from some quite unskilled jobs to those requiring specialized education and training. For example, janitors are included here, but also waiters, cooks, barbers, laundry workers, beauticians, policemen, firemen, practical nurses, and FBI agents. Over many decades up to the end of World War II, this group rose only slightly as a proportion of the entire labor force, but since then it has sprinted ahead of labor force growth as a whole. The increased demand for services of all kinds reflects not only the needs of a growing population but of the greater concentration of people in urban areas, an increasing number of women who go out to work and hence need these services, and generally rising income levels. By 1970, we can expect a numerical growth of service workers to more than 10 million, on a par numerically and proportionately with professional workers.

Growth of this group, nevertheless, will not escape some of the slowing down effects of mechanization and new kinds of equipment. For example, barbers and beauticians are feeling the effects of widespread use of electric razors and home permanent-wave kits, and certain groups of household workers, such as laundresses, are being supplanted by commercial laundry services and housewives who use electric washing machines, dryers, and ironers. On the other hand, many occupations in this group will grow substantially—the policemen and firemen who guard our safety, the hospital attendants and practical nurses who guard our health, and others whose basic function can not



be supplanted by machines. These are the occupations which also require more training than many of the service occupations that are declining.

To sum up, the principal occupational changes expected in the 1960's will be:

(1) a continuing rapid growth in white-collar occupations, especially in the professions;

(2) among blue-collar workers, a slower growth in skilled and semiskilled occupations and little change in employment in unskilled occupations;

(3) a somewhat faster-than-average growth among service workers; and

(4) a further decline in employment among farmers and farm laborers.

## Implications of the Outlook for Education and Training

It is clear that multitudes of opportunities will open up for jobseekers during the years ahead. The ability of young people to embrace these opportunities, however, will depend to an important extent on their education and training. The job world of the future obviously calls for people who have a marketable skill. The day of the "I can do anything," applicant is definitely past. In these days of increasing complexity of jobs and of professional specialization, no one, whether young or old, will be able to offer such versatility in the job market.

Since the fastest growing occupations also call for the most education or specialized training, it becomes obvious that a young worker's chances for a steady, well-paying job in many areas of our economy will be substantially less if he does not have at least a high school education. For many "growth" jobs, in professional and scientific and technical fields especially, he must have considerably more.

The need for educational upgrading of the work force will not be confined to the professions alone. As new, automated equipment is introduced on a wider scale in offices, banks, insurance companies, and government operations, the skill requirements for clerical and other office jobs will rise also. The demand of employers for better trained personnel to operate complicated and expensive machinery is already apparent.

Just how soon industrial processing will yield to an emerging pushbutton era is difficult to predict, but declining employment in automobile production, for example, suggests that in this and some other leading industries the effects of automation have been felt for the past 2 or 3 years. In some segments of the sales field,

too, new developments in machine design, use of new materials, and the complexity of equipment are making it necessary for demonstrators to have greater understanding of technical matters; and repairmen must become familiar with ever more complicated machines.

The rising educational level of the younger population is a partial response to these developing labor market requirements. In 1960, two-thirds of the population 18 years of age had completed high school, compared with only about 1 in 15 in 1900. College enrollments are also rising rapidly. For example, of 1.7 million high school graduates in 1960, 45 percent were enrolled in college in the fall immediately following completion of high school. Additional thousands were enrolled in special training courses such as nursing, apprenticeships of various kinds, and others.

Estimates covering a longer period, between 1950 and 1970, give an even sharper indication of the continuing rise in the numbers of high school and college graduates. By 1970, high school enrollment will be double the 6½ million of 1950 and college enrollment will be about 2½ times the 2.7 million of 1950.

With so much competition from young people with higher levels of education, the boy or girl who does not get good preparation for work, either by completing high school or college or by some other effective means, will find the going rougher and rougher in the years ahead. Labor Department studies indicate the possibility of 7½ million school dropouts during the 1960's, of whom 2½ million will not have completed even the 8th grade. These young people will find jobs harder and harder to get because employers prefer the worker who has

“stayed the course” through high school. At the same time, the unskilled jobs that once absorbed many untrained people will be a narrowing field of employment.

These facts bring us back, full circle, to the point made at the beginning of this chapter, that the nature of one’s job determines in large measure the nature of one’s life. Young people

who have acquired a skill or a good basic education will have a better chance at interesting work, good wages, steady employment, and greater satisfaction with life in general. Getting as much education and training as one’s ability and circumstances permit should, therefore, be high on the list of things to be done by today’s youth.

# Professional, Administrative, and Related Occupations

Professional and administrative occupations have many attractions for young people considering the choice of a career. These occupations offer opportunities for interesting and responsible work and lead to relatively high earnings. As a rule, however, they can be entered only after long periods of specialized education or other preparation, since a broad knowledge

of one's field and judgment of a high order are outstanding requirements for success in these types of work.

More than one-fifth of all workers in 1960 were in professional, administrative, and related occupations. These occupations—employing about 14½ million people—accounted for about half of all white-collar employment.

## Professional and Related Occupations

Professional occupations are of two main types. The largest group of professions—including those of engineer, architect, physician, lawyer, and teacher—requires formal education in well-organized fields of knowledge. The other group—including occupations such as editor and actor—does not require as much specialized, theoretical knowledge, but demands a great deal of broad background knowledge or creative talent and skill acquired chiefly through experience. Generally, the professions require either college graduation—often with an advanced degree—or experience of such kind and amount as to provide a comparable background. Licenses are required for practice in many professions—medicine, dentistry, and pharmacy, for example—with licensing authorities determining the minimum qualifications which members must have. Professional societies also set up membership standards, which tend to define their respective fields. In many areas of work, however, there is no clear-cut line between professional and other classes of workers.

It is not easy to prepare for and enter professional work. For most professions, one must complete a long period of education and training. Often, applicants are not accepted for professional training unless their school grades

are high, and employers generally give preference in hiring to graduates whose grades in professional school put them high in their class.

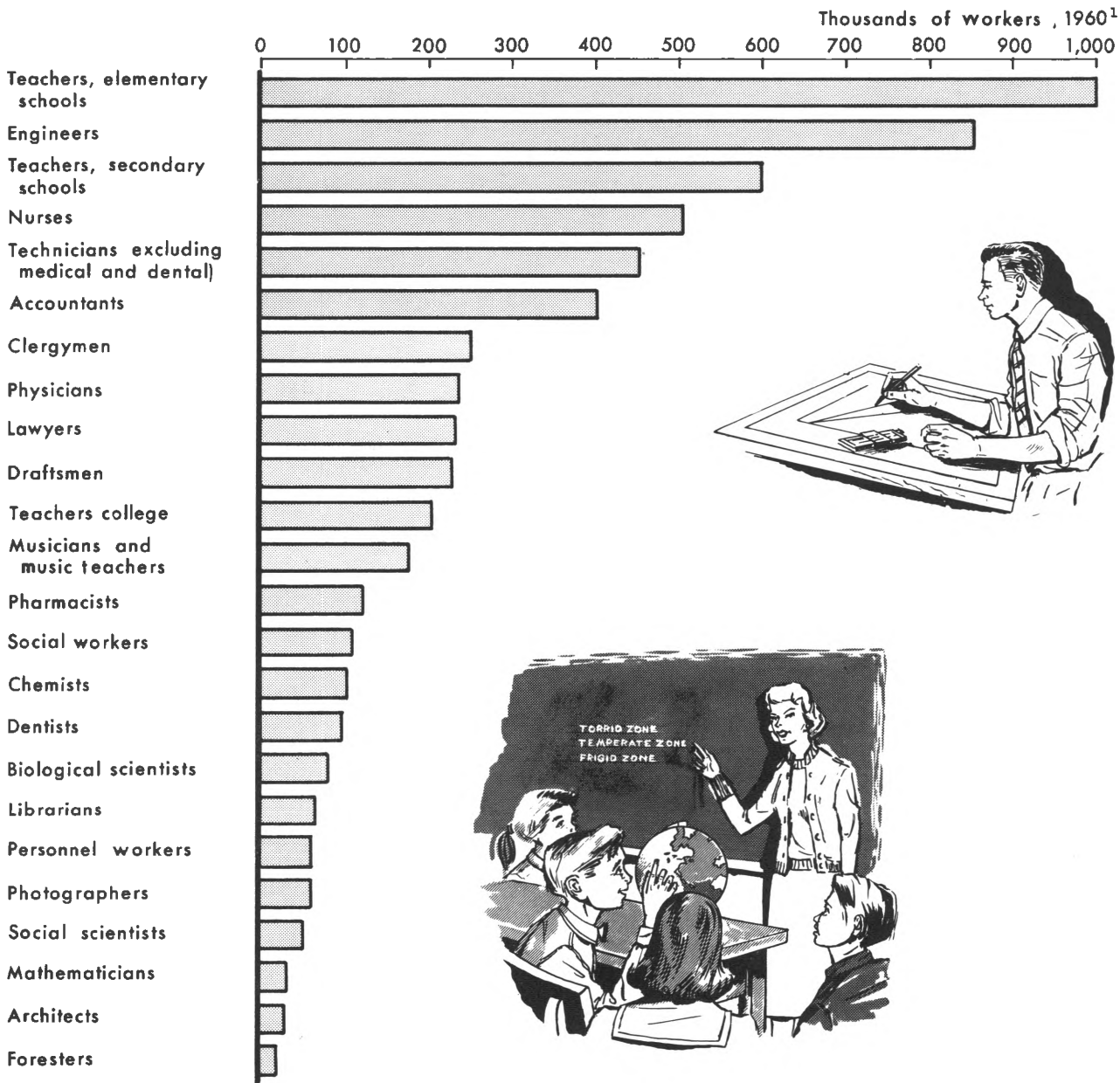
Closely related to the professions—and sometimes overlapping them—is a wide variety of technical occupations. People in these occupations work with engineers, scientists, physicians, and other professional personnel. Their job titles include, for example, those of draftsman, engineering aid, and electronic, laboratory, or X-ray technician. Employment in these technical occupations usually requires a combination of basic scientific knowledge and specialized education or training in some particular aspect of technology or science. Such training may be obtained in technical institutes, junior colleges, and other schools, or through equivalent on-the-job training. Many of the duties of technicians may be performed also by beginning professional workers. However, because of their more limited educational background, technicians generally find it much more difficult to advance to high-level positions than do professional workers.

The major professional, technical, and related occupations are shown in chart 11. Teaching, engineering, nursing, and accounting are by far the largest professions.

CHART 11

TEACHING AND ENGINEERING ARE THE LARGEST PROFESSIONAL OCCUPATIONS.....

Employment in Selected Professional, Technical, and Kindred Occupations



<sup>1</sup> Estimated.

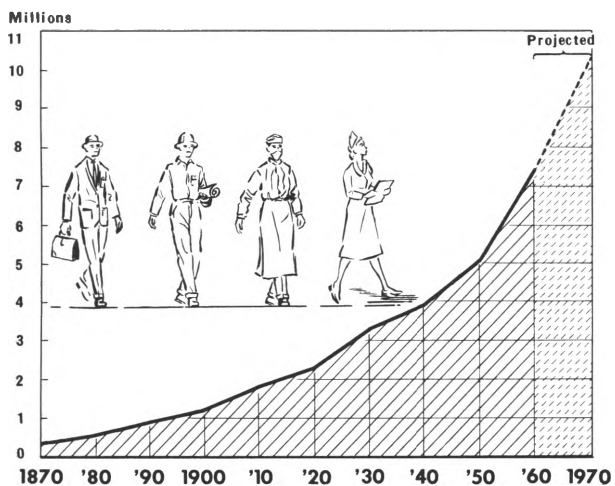
**Employment Trends**

Employment in professional, technical, and related occupations has risen rapidly over the years. From less than half a million in 1870,

the number of these workers has grown to about 7½ million in 1960. (See chart 12.) Moreover, while the professions accounted for only about 4 percent of all workers at the turn of the

CHART 12

GROWTH OF PROFESSIONAL, TECHNICAL, AND KINDRED OCCUPATIONS.....



1960 and 1970 figures not strictly comparable to earlier years.  
Source: U.S. Department of Commerce, U.S. Bureau of the Census, and U.S. Department of Labor, Bureau of Labor Statistics.

century, by 1960, they represented more than 11 percent. During the 1950 decade, the rate of growth in the professions was nearly twice that for clerical workers, the second fastest growing occupational group.

A major reason for the increase in the total number of workers in professional and related occupations has been the development of new professional fields. The scientific, engineering, and closely related professions have had a spectacular growth over the years, while employment in the traditional professions—medicine, the ministry, law, and teaching—has risen more slowly. Other major professions, which have developed wholly or largely during the present century include social work, accounting, and personnel work. In addition, growth has been rapid in technical occupations, especially since the 1940's. This growth has accompanied the expansion in scientific and engineering professions. As scientific and technical work has become more highly organized, particularly in the laboratories and engineering departments of large firms and in government agencies, more technical assistance has been provided for the professional workers. Similarly, large numbers of technicians and assistants work in the health

fields, thereby freeing the professional personnel for work requiring more training.

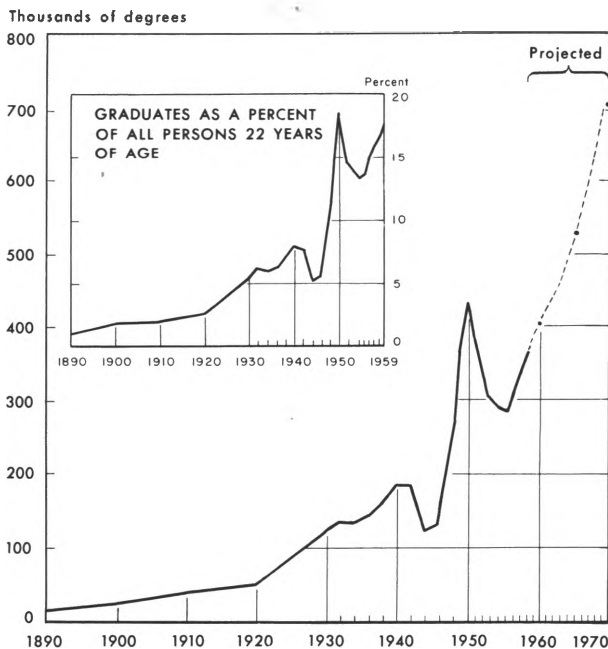
During the 1960's, the professional and technical occupations will probably continue to grow at a faster rate than any other broad occupational group. However, there will naturally continue to be differences in the rate of growth among the professions, as is indicated in the statements on most of the major professions in the chapters that follow.

Educational Trends

The growth of the professions has been accompanied by a great increase in the numbers of young men and women graduating from college—who are, of course, the chief source of professionally trained workers. The proportion of young people completing college (represented as a percent of all persons 22 years of age) rose from 2½ percent in 1920 to 8 percent in 1940 and to 18 percent in 1960, as shown in the inset in chart 13. (The high level reached in 1950, is artificial, reflecting the large number

CHART 13

NUMBER OF BACHELOR'S DEGREES GRANTED.....



Source: U. S. Department of Health, Education, and Welfare, Office of Education.

of veterans who went to college under the veterans' education program and who, in many cases, would have completed college earlier if it had not been for the war.)

The recent rapid increase in the proportion of young people graduating from college (chart 13) reflects a number of basic social trends. Family incomes are higher, and more people can afford to put off going to work and to pay the costs of education. More families want a college education for their children. Scholarships and loans are available for more students; part-time work opportunities are also available, particularly in times of labor shortages. Finally, a college education is becoming necessary for an increasing proportion of jobs, and in many professions the amount of education needed is increasing. Since these factors will probably continue to be influential in the future, the proportion of young people who graduate from college is expected to go on increasing for many years. The college-age population is also growing. The number of people aged 18 to 21 will rise by 5 million during the 1960's. These factors, considered together, point to a great increase in college graduations, assuming that the Nation's colleges and universities can build the classrooms, laboratories, dormitories, and other facilities and hire the faculty members needed to provide for the greatly increased numbers of students. It is likely that the number of bachelor's degrees awarded annually will almost double the 1959 figure by 1970. Projections prepared by the U.S. Office of Education indicate an increase from the 385,151 bachelor's degrees granted in 1959 to 401,000 in 1960, 529,000 in 1965, and 709,000 in 1970.

The number of students taking graduate training has also risen very rapidly during past decades, and will probably continue to mount in the years ahead. A master's degree is usually earned through 1 or 2 years of study beyond the bachelor's degree. To earn the Ph.D. (doctor of philosophy) degree usually requires 3 or more years beyond the bachelor's degree. As a rule, graduate study is concentrated in the major subject field of the student's interest, whereas undergraduate study is broader in content.

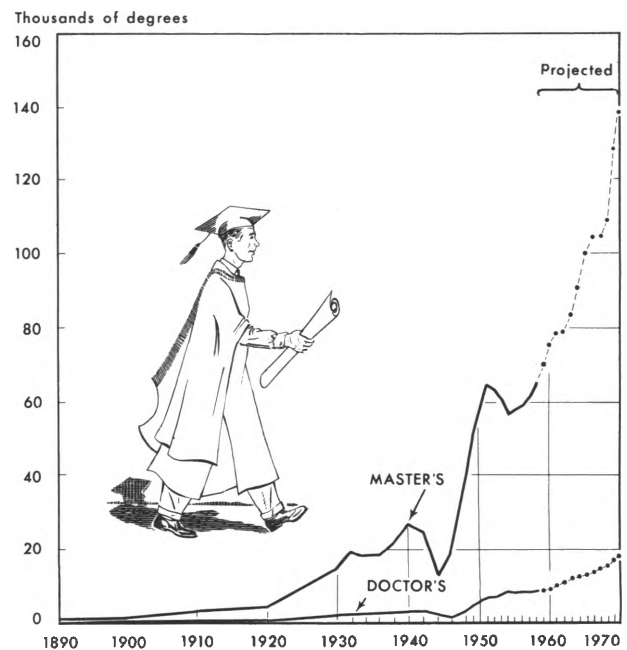
Chart 14 shows the tremendous increase in

graduate degrees awarded since 1920 in all fields taken together. The numbers of master's and doctor's degrees granted reached unprecedented heights in the early 1950's, following the record number of bachelor's degrees granted a few years before. After a slight decline in the mid-1950's, master's degrees rose to about 69,000 in 1959 and are expected to exceed 100,000 in 1965, if past trends continue. The number of doctorates awarded (9,360) in 1959 may reach 13,000 by 1965. According to projections made by the U.S. Office of Education, the number of master's degrees conferred may reach 140,000 and doctorates may approximate 18,000 in 1970.

These projections obviously imply a great increase in the supply of personnel which will be available for professional employment. Since the demand for personnel is also expected to show continued growth, there is promise of expanding employment opportunities for the increasing numbers of college graduates. The anticipated increases in college-trained personnel raise the possibility, however, of increasing

CHART 14

NUMBER OF MASTER'S AND DOCTOR'S DEGREES GRANTED.....



Source: U.S. Department of Health, Education, and Welfare, Office of Education.

competition during the 1960's for the better professional positions in at least some fields of

work, as indicated in the statements on the various fields in following chapters.

## Administrative and Related Occupations

People in administrative and related occupations run the Nation's businesses and manage a wide variety of other organizations, both private and governmental. The problems they deal with are as varied as the affairs they manage. They may have to decide, for example, whether and how to manufacture a new model of automobile, furnish a hotel lobby, advertise a store, or build a highway. Whether their organizations are small or large, employing only a few people or many thousands, the decisions administrators reach and their effectiveness in getting these decisions carried out contribute greatly to the success or failure of the enterprise.

About 6 million men and 1 million women, not counting farm owners or farm managers, were chiefly engaged in administrative or related work in 1960. These 7 million people were about equally divided between proprietors in business for themselves and managers and officials in salaried positions.

The largest group of proprietors—about half of the total number—are owners of stores, restaurants, gasoline service stations, or other kinds of retail establishments. In addition, large numbers manage their own factories or construction businesses.

Executives and other managerial personnel in business firms form the largest group of salaried managers and officials. In addition, several hundred thousand people in this category are officials of Federal, State, and local government agencies and nonprofit organizations of many kinds; and there is a very large number of other workers—purchasing agents, credit men, and many others—in specialized jobs closely related to administrative and managerial work. Also grouped with administrative workers in the occupational statistics are persons in a variety of official and managerial positions—for example, Members of Congress, ship captains, railroad conductors, trade union officials,

and building managers and superintendents—whose functions and background are quite different from those of most administrative personnel and who are, therefore, not covered by the rest of the information presented in this part of the Handbook. (Some of these occupations are discussed elsewhere in the Handbook, however; see index for page numbers.)

The number of people in administrative and managerial positions is growing in the United States, although by no means as fast as the number of professional workers. Fifty years ago, in 1910, only 1 out of every 15 workers in the country was in an administrative or related job. By 1960, the proportion had risen to about one out of every nine workers. Employment in this field as a whole is expected to continue increasing moderately. By 1970, the total number of people in administrative and related positions may be nearly 9 million, over a fifth more than in 1960.

Most of this increase in employment will be in salaried positions. Growth in the number of self-employed proprietors will be relatively slow in the years ahead, because of the trend toward the formation of larger businesses. In the retail field, for example, supermarkets and other types of large stores are replacing the small general store, the separate meat market, the corner grocery store. On the other hand, the number of managers and salaried officials in business organizations and government agencies is mounting rapidly.

This trend has brought with it an increased demand for college graduates to fill executive-trainee and other managerial positions. College graduates are now being given preference over people with comparable experience, but less education, for many administrative positions which either did not exist a few decades ago or which would have been filled by employees selected primarily on the basis of their experience and personal characteristics. This emphasis on a college education will probably be

reinforced in the years ahead—in view of the growing complexity of modern industry and technology, which is constantly increasing the

amount of technical knowledge required for effective performance in many administrative jobs.



# TEACHING

Teaching is the largest of all the professions. More than 1¾ million men and women in the United States are full-time teachers, and thousands of others teach on a part-time basis (chart 15). Many scientists, physicians, accountants, and members of other professions teach one or more classes in colleges and universities. Similarly, large numbers of craftsmen—carpenters, mechanics, and others—teach part time in vocational schools. Also, many other people instruct in adult education programs.

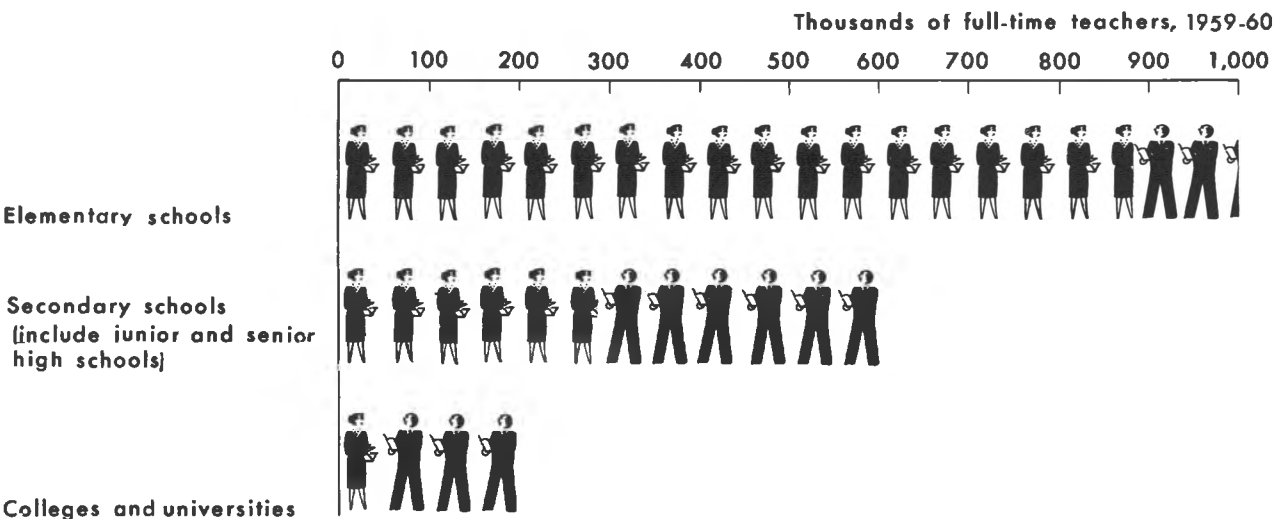
No other profession offers so many employment opportunities for women; about 1 million women are teachers, more than twice the number employed in nursing—the second largest field of professional employment for women. Women teachers far outnumber men in kinder-

garten and elementary schools. The numbers of men and women, however, are about equal in secondary (junior and senior high) schools, and men hold about four-fifths of all college and university teaching positions.

The number of teachers needed by the Nation's schools depends chiefly, of course, on the number of students enrolled. In the fall of 1960, nearly 49 million people—more than one-fourth of the country's total population—were enrolled in the Nation's schools and colleges. The extremely high birth rates of the past two decades largely account for this record enrollment. For example, the high birth rates of the 1940's brought unprecedented increases in elementary school enrollments in the early 1950's. By the mid-1950's, these children were beginning to enter the high schools, and toward the end of

CHART 15

## MORE THAN HALF THE NATION'S TEACHERS ARE IN ELEMENTARY SCHOOLS.....



Source: U.S. Department of Health, Education, and Welfare, Office of Education.

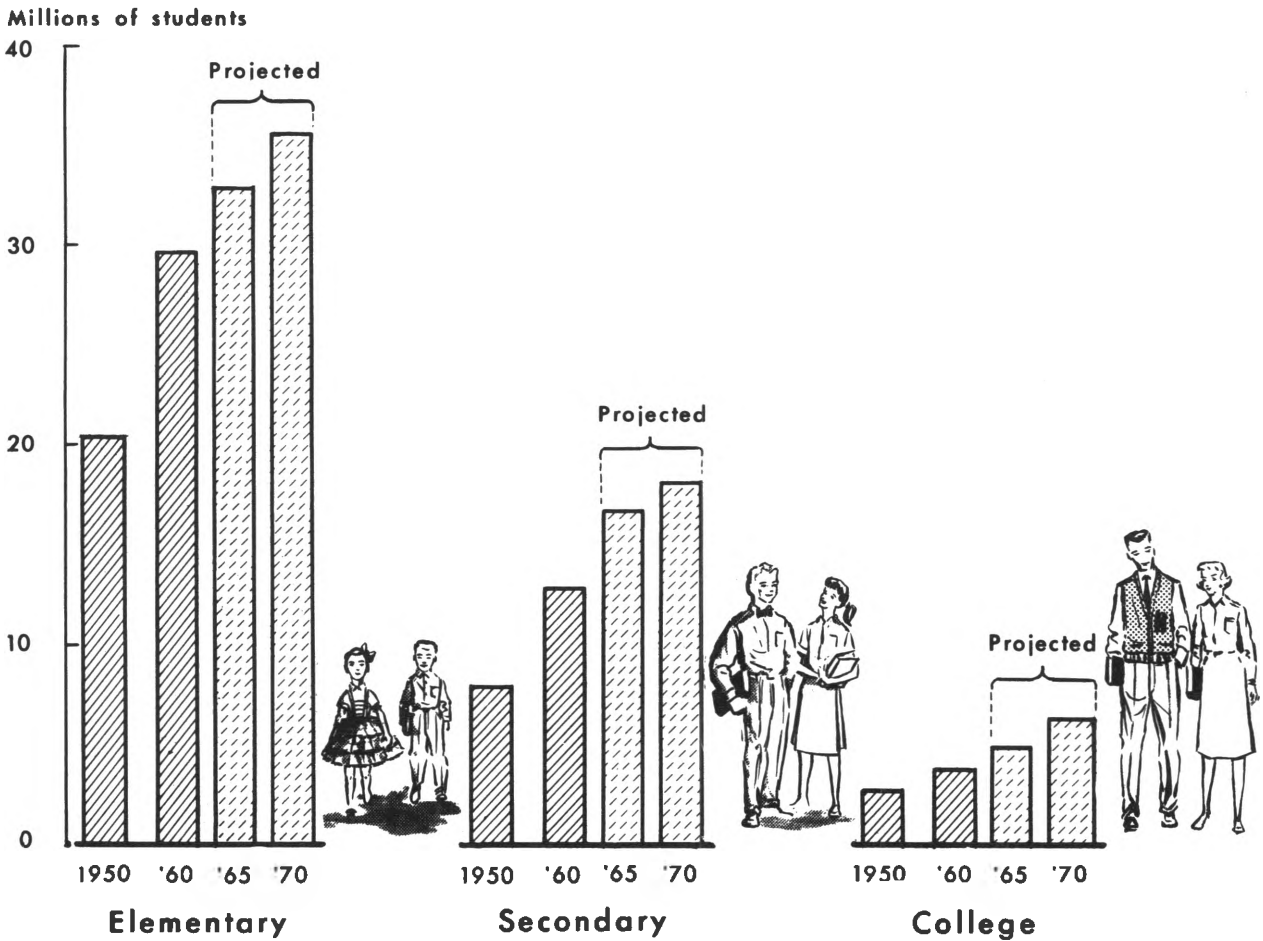
the decade the colleges were beginning to feel the impact of the high birth rates. Furthermore, the proportion of young people of high school and college age who are attending school is higher than ever before. A continuation of both these trends—population growth and increased high school and college attendance—is expected to produce an impressive rate of increase in high school enrollments by 1970 and an even more rapid increase in college enrollments. The proportion of young children of elementary school age enrolled in these schools

is not expected to change appreciably during the coming decade; nevertheless, a sizable increase in the number of children so enrolled is expected. Total enrollments in all schools and colleges combined, according to U.S. Office of Education estimates, may increase to more than 60 million by 1970 (chart 16).

To staff the new classrooms that must be provided for the rising numbers of students, the Nation's teaching staff will need to be about one-third larger by 1970. In addition, a still greater number will be required to replace

CHART 16

**SCHOOL AND COLLEGE ENROLLMENTS CONTINUE TO MOUNT.....**



Source: U.S. Department of Health, Education, and Welfare.

teachers who leave the profession. Many new teachers will also be needed, in both elementary and secondary schools, to reduce overcrowding and to replace teachers with substandard qualifications. This school staffing problem has brought about an increasing interest in technological developments and other changes in educational methods. Educational television, for example, is already in use on an experimental basis, and its extension may enable many teachers to handle larger classes efficiently in some subject areas. Teaching machines designed to present information mechanically and to test student responses to the material covered are being considered for use as a teaching aid where appropriate. Language laboratories where tape recordings are used in foreign language instruction are being set up in many secondary schools and colleges. Other adjustments, including lengthening the school year and providing teachers with clerical assistance,

may also affect the demand for teachers. Although opinions differ concerning the effect of these innovations, it seems likely that, for the next few years at least, their chief effect may be to improve the quality of education.

The outlook for teachers at each educational level—in elementary and secondary schools, and also in colleges and universities—is discussed in the following statements. A statement on the specialized field of school counseling is also included in the chapter.

#### Where To Go for More Information

U.S. Department of Health, Education, and Welfare, Office of Education. Two publications by this Office which are of special interest are: *Teaching as a Career* (Bull. 1955, No. 2) and *Teaching Opportunities* (Circular No. 589).

See pages 40, 43, 46 and 769 for additional sources of information.

## Kindergarten and Elementary School Teachers

(D.O.T. 0-30.02 and .11)

### Nature of Work

Elementary school teaching is the largest field of professional employment for women and is also a growing field for men. In 1960, about 1 million kindergarten and elementary teachers were employed in elementary schools. This total included more than 800,000 classroom teachers and several thousand principals and supervisors in public schools; and more than 100,000 teachers in parochial and other private schools.

Kindergarten teachers provide a program of education for young children. Most frequently they divide the schoolday between two groups, teaching two classes a day. Some, however, may work with one group all day. The kindergarten program provides the children with experiences in play, music, artwork, stories, and poetry; it also introduces them to science, numbers, language, and social studies. After school hours, kindergarten teachers may plan the next day's work, study and prepare the children's school records, confer with parents or professional personnel concerning individual children,

participate in teachers' in-service activities, and locate and become familiar with teaching resources.

Elementary school teachers usually work with one group of pupils during the entire schoolday, teaching several subjects and supervising various activities such as lunch and play periods. In some school systems, however, teachers in the upper elementary grades may teach several groups of children in one or two subjects. Many school systems also employ special teachers to give instruction and to assist classroom teachers in subjects such as art, music, physical education, industrial arts, and homemaking. Teachers in schools with only a few students, especially in rural areas, may be required to teach all subjects in several grades.

Although the time spent in the classroom is usually less than the average working day in many other occupations, the elementary school teacher must spend additional time each day on such activities as planning work, preparing instructional materials, developing tests, checking papers, making out reports, and keeping



Courtesy of U.S. Office of Education

*More than a million teachers are employed in the Nation's elementary schools.*

records. Conferences with parents, meetings with school supervisors, and other professional activities also frequently occur after classroom hours.

### Where Employed

Elementary school teachers are employed in all cities, towns, villages, and in rural areas. Well over half of them, however, are employed either in rural areas or in towns with fewer than 10,000 population. Although the number of 1-room schools is steadily decreasing as a result of reorganization of school districts, the U.S. Office of Education estimates that about 19,000 teachers are still employed in these schools, which are located chiefly in the North Central States—particularly in Iowa, Nebraska, Wisconsin, and South Dakota. Kindergarten teachers, however, are employed primarily in the large city school systems.

### Training, Other Qualifications, and Advancement

All States require every teacher in the public schools to hold a certificate. Several States have this same requirement for teachers in parochial and other private elementary schools.

In 1961, 42 States and the District of Colum-

bia issued regular teaching certificates only to persons with at least 4 years of approved college preparation, and 8 other States required at least 2 years. Some school systems have educational requirements higher than those established for State certification.

In nearly all States, certificates are issued by State departments of education on the basis of transcripts of credits and recommendations from approved colleges and universities. Certificates may be issued to teachers from other States if the prescribed programs have been completed at accredited colleges. Under certain conditions, usually related to a shortage of qualified teachers, most States will issue emergency or temporary certificates to partially prepared teachers. However, these teachers must have their certificates renewed every year until all requirements for regular certificates have been met.

All States and many individual school systems have certain additional requirements for public school teaching. They may, for example, require a health certificate, evidence of citizenship, or an oath of allegiance. The prospective teacher should find out about the exact requirements of the area in which he plans to work by writing to the State department of education or to the superintendent of the local school system.

Most institutions of higher education offer teacher preparation. In a 4-year teacher-preparation curriculum, the prospective elementary school teachers spend roughly one-fourth of the time in professional courses learning about children, the place of the school in the community, and materials and methods of instruction—including practice teaching in an actual school situation; the remainder of the time is devoted to studying academic subjects common in the usual liberal arts program. Some study of the process of learning and human behavior is usually included.

Beginning teachers will find opportunities for advancement through annual salary increases in the same school system; by transferring to a system with a higher salary schedule which recognizes experience gained in another school system; by appointment to a

supervisory, administrative, or specialized position; or by obtaining additional preparation.

Among the most important personal qualifications for elementary school teaching are a love and enjoyment of children. Teachers must be patient and self-disciplined, and have high standards of personal conduct. A broad knowledge and appreciation of the arts, sciences, history, and literature are also valuable. Civic, social, and recreational activities of teachers are often influenced, and sometimes restricted, by the customs and attitudes of their community.

### Employment Outlook

Many thousands of openings for elementary school teachers will occur each year throughout the 1960's. Enrollments in kindergarten and grades 1 through 8 will continue to rise during this period, but possibly at a slower rate than in the preceding decade. As a result, the demand for teachers to staff new kindergarten and elementary school classrooms is expected to level off in the mid-1960's. Nevertheless, according to U.S. Office of Education projections, an average of 15,000 new teachers will be needed annually to take care of the increase in enrollments, and in addition, an average of close to 100,000 annually will be required as replacements. Each year, a large number of young women enter the teaching profession and then withdraw because of marriage or for other reasons. In addition, many teachers will reach retirement age.

Altogether, the number of additional elementary and kindergarten teachers needed will be, on the average, about 115,000 each year during the 1960 decade, unless replacement rates are reduced considerably. This figure does not provide for the additional teachers needed to lower the pupil-teacher ratios in overcrowded classrooms, to replace persons not meeting regular requirements, to extend kindergarten facilities to all areas, or to provide for other improvements. On the other hand, classroom innovations and technological developments may affect the number of teachers needed. Educational television, for example, is already in use on an experimental basis and its expansion may

enable teachers to handle larger classes efficiently in some subject areas. Other adjustments such as lengthening the school year and providing teachers with clerical assistance may also affect the demand for teachers.

The number of students preparing for elementary school positions each year is likely to continue to fall short of the demand for new teachers. For example, in 1961, only 57,000 prepared for such teaching positions, whereas at least twice that number were needed. Some expansion in the supply of qualified teachers is expected to result from the increasing college population and the offering of special incentives such as those provided by the National Defense Education Act of 1958 under which financial aid is given to students who desire to enter the teaching profession. As in the past decade, the deficiency in the supply of elementary school teachers will probably continue to be met by issuing short-term emergency certificates to teachers not meeting regular requirements, by increasing the size of classes, by the reentry of former teachers into the profession, and by attracting qualified personnel from other fields of work. Shortages will tend to be greatest in areas where teachers' salaries are lowest or where better-paying employment opportunities are available in other fields.

Barriers to the employment of certain groups, particularly married women and older men and women, are being continually lowered, largely because of teacher shortages.

### Earnings and Working Conditions

The average salary for classroom teachers in public elementary schools, according to National Education Association estimates, was \$4,835 in 1959-60. In three States (Alaska, California, and New York), teachers' salaries averaged more than \$6,000; in seven States (Arkansas, Kentucky, Mississippi, Nebraska, North Dakota, South Carolina, and South Dakota), less than \$3,500.

Teachers' salaries are usually lowest in rural schools and highest in large city systems, where educational and experience requirements are likely to be highest.

Teachers generally enjoy a dignified and respected position in their communities, and are often relied upon for counsel and advice. Their employment is steady, and usually not affected by changes in business conditions. Tenure provisions protect teachers from arbitrary dismissal. Pension plans and sick leave plans are common practices, and a growing number of school systems grant other types of leave with pay.

Most schools are in session about 9 months a year. Teachers, therefore, have a long vacation period, during which they often work at other jobs or take summer courses for professional growth and to help them obtain advancement and salary increases. Some school systems, however, are extending the teachers' working year to 12 months with a 1-month vaca-

tion period in the summer. These systems, then, require the teacher to teach in summer sessions or attend workshops during the time beyond the regular school year.

### Where To Go for More Information

Information on schools and certification requirements in a particular State is available from the State department of education at the State capital.

General information on teaching may be obtained from:

U.S. Department of Health, Education, and Welfare,  
Office of Education, Washington 25, D.C.

National Education Association,  
1201 16th St. NW., Washington 6, D.C.

## Secondary School Teachers

(D.O.T. 0-31.01 and .10)

### Nature of Work

Secondary school teachers—those employed in junior and senior high schools—usually specialize in a particular subject such as English, history, mathematics, or science. They teach several classes every day either in their main subject, in related subjects, or both. The most frequent combinations are English and history or other social science subjects; mathematics and general science; and chemistry and biology or general science. Teachers in fields such as home economics, agriculture, commercial subjects, driver education, music, art, and industrial arts less frequently conduct classes in other subjects.

Besides giving classroom instruction from 20 to 30 hours each week, secondary school teachers develop and plan teaching materials, develop and correct tests, keep records, make out reports, consult with parents, supervise study halls, and perform other duties. Many supervise student activities, such as clubs and social affairs—sometimes after regular school hours. Maintaining good relations with parents, the community, and fellow teachers is an important aspect of their jobs.

Nearly 600,000 teachers, principals, and

supervisors were employed in the Nation's public and private secondary schools in 1959-60. Slightly more than half the classroom teachers in public secondary schools were men, but women predominated in private schools. Men outnumber women in supervisory and administrative positions in both public and private schools.

### Where Employed

The number of grades in secondary schools depends on how the local school system is organized. Many secondary school teachers are employed in 6-year combined junior-senior high schools (grades 7-12) in which nearly one-third of all public secondary school students were enrolled in 1959. Another large group of teachers are in separate junior high schools of either two or three grades (7-8, or 7-9), in which nearly one-quarter of the secondary students were enrolled in 1959. The remainder teach in 4-year high schools (grades 9-12) and in senior high schools (grades 10-12).

Despite school consolidations, more than half of the secondary school teachers are still employed in rural areas or in cities of less than



Courtesy of U.S. Office of Education

*High school teachers use language laboratories in foreign language instruction.*

30,000 population; close to one-third are in rural schools.

### **Training, Other Qualifications, and Advancement**

In every State, a certificate is required for public secondary school teaching. To qualify for this certificate, the prospective teacher must have a bachelor's degree. Most States require, in addition, the equivalent of one-half year of education courses, including practice teaching, plus specialized courses in one or more subjects commonly taught in secondary schools.

The States of Arizona, California, New York, Oregon, and Washington, and the District of Columbia grant secondary certificates only to persons with a year of graduate work. Many school systems, especially in large cities, have requirements beyond those needed for State certification. Some systems require additional educational preparation, successful teaching experience, or special personal qualifications.

College students preparing for secondary school teaching usually devote about one-third of the 4-year course to their major, which may be in a single subject or a group of related subjects. About one-fifth of the time is spent in education courses—learning about children, the place of the school in the community, and materials and methods of instruction—including practice teaching in an actual school situation. The remaining time is devoted to general

or liberal education. Satisfactory teacher-preparation curriculums are offered by universities with schools of education, by colleges with strong education departments and adequate practice-teaching facilities, and by teachers' colleges.

Although certification requirements vary among the States, the person who is well prepared for secondary school teaching in one State usually has little trouble meeting requirements in another State. A well-qualified teacher can ordinarily obtain temporary certification in a State while he prepares to meet any additional requirements.

Qualified secondary school teachers may advance to positions as supervisors, assistant principals, principals, superintendents, or other administrative officers. At least 1 year of professional education beyond the bachelor's degree, plus several years of successful classroom teaching experience, are required for most supervisory and administrative positions. Often a Ph.D degree is required for appointments as superintendent. A few experienced teachers are assigned to the positions of part- or full-time guidance counselors, teachers who instruct in the pupils' homes, or instructors of handicapped or other special groups. Usually additional preparation, and sometimes special certificates, are required for these assignments.

Probably the most important personal qualifications for secondary school teaching are an appreciation and understanding of adolescent children accompanied by a devotion to guiding their growth. Patience and self-discipline are desirable traits as also are high standards of personal conduct. In addition to a special enthusiasm for the subjects they teach, a broad knowledge and appreciation of the arts, sciences, history, and literature are also desirable. Civic, social, and recreational activities of teachers are often influenced, and sometimes restricted, by the customs and attitudes of their community.

### **Employment Outlook**

A growing number of secondary school teachers will be needed during the 1960's, when enrollments will expand rapidly as a result of

the high birth rates following World War II. The great increase in population reaching high school age, combined with the trend for a growing proportion of young people to enter and graduate from high school, will result in an average annual demand for about 25,000 additional teachers, according to the U.S. Office of Education. Furthermore, throughout the 10-year period, vacancies created by turnover will exceed the number of new positions. Altogether, the U.S. Office of Education estimates that more than 90,000 new secondary school teachers must be recruited each year during the 1960's. Classroom innovations and technological developments, however, may affect the number of teachers needed. Educational television, for example, is already in use on an experimental basis, and its expansion may enable teachers to handle larger classes efficiently in some subject areas. Teaching machines that are designed to present information mechanically and to test student responses to the material covered are being considered for use as a teaching aid where appropriate. Language laboratories where tape recordings are used for the teaching of foreign languages are being used in many secondary schools. Other adjustments, including lengthening the school year and providing teachers with clerical assistance, may also affect the demand for teachers.

The supply of persons available to fill teaching positions each year is difficult to estimate. Although most of the new teachers are drawn directly from college graduating classes, some positions are filled by former teachers (many of whom dropped out to care for their young children), by persons not meeting certification requirements, and by fully qualified persons who have been in other types of employment. Not all qualified new graduates seek teaching positions. For example, in June 1960 about 78,000 college graduates met certification requirements for secondary school teaching; of these, however, only about two-thirds were teaching the following academic year. The rest were employed in positions other than teaching, were engaged in graduate study, were in the military service, had become homemakers, or were otherwise lost to the teaching field. Similarly, a

large proportion of the 85,000 potential teachers graduated in 1961 were not available for teaching positions. Should this situation persist throughout the 1960 decade, well-qualified candidates seeking to enter secondary school teaching will find employment opportunities in most geographic areas and in most subject fields.

Employment opportunities for teachers are expected to continue to be best in science, mathematics, industrial arts, and other subject fields for which the demand in private industry is also great. When economic conditions are unfavorable, competition for teaching positions increases. At such a time, certification requirements are often raised.

### **Earnings and Working Conditions**

The average annual salary for all classroom teachers in public secondary schools was about \$5,334 in 1959-60, according to estimates by the National Education Association. In Alaska, California, and New York, average salaries exceeded \$6,000; the average was less than \$3,500 in only one State.

Junior high school teachers frequently receive somewhat lower salaries than high school teachers in the same school system; however, the trend is toward equalizing salaries of teachers with the same educational preparation, regardless of grade taught or sex. Teachers of vocational education, physical education, and other special subjects often receive higher salaries for their work than do other teachers in the same school. Under the salary schedules in effect in most school systems, teachers in all subject fields receive regular salary increases as they gain experience and additional education.

Salaries of teachers are usually lower in towns and small cities than in larger cities, but higher educational and experience requirements are likely to prevail in large city school systems. On the average, salaries of principals in the largest cities, where administrative responsibilities are great, are much higher than in towns and small cities. Salaries of superintendents are as high as \$25,000 in many large cities.



Teachers often add to their incomes by teaching in summer school sessions, working as camp and recreational counselors, or doing other work. Many teachers, however, use their vacation periods to work toward advanced degrees or to take specialized courses. Some teachers supplement their incomes during the regular school year in various ways. For example, they may teach in adult education or other evening classes, work part time in business or industry, or write for publication.

Some form of retirement, often under the Government social security program, is provided for most teachers. Nearly all school systems have some provision for sick leave and an increasing number grant other types of leave with pay.

## College and University Teachers

(D.O.T. 0-11.50)

### Nature of Work

More than 300,000 faculty members are employed in the Nation's 2,000 colleges and universities. However, probably fewer than 200,000 of these staff members were engaged in full-time teaching in 1960. Close to 100,000 were teaching on a part-time basis in medicine, law, business administration, and other professional fields. Other faculty members were employed in administrative work, full-time research, or other educational activities. Men predominated in most college teaching fields and held about 95 percent or more of the positions in engineering, the physical sciences, agriculture, law, and philosophy. Only about one-fifth of all college and university teachers were women; however, the majority of teachers in the fields of nursing, home economics, and library science were women.

College and university teachers instruct students in specific subject fields. More than half of all faculty members teach courses in social science, fine arts, English, physical science, education, or engineering. In many 4-year institutions, the usual teaching load is from 12 to 15 hours a week. Associate professors and full professors—who also serve as advisers to graduate students—may spend only 6 or 8 hours a week in actual classroom work. Besides teach-

### Where To Go for More Information

Information on Vocational Agriculture Teachers is given elsewhere in the Handbook. (See index for page number.)

Information on schools and certification requirements in a particular State is available from the State department of education at the State capital.

General information on teaching may be obtained from:

U.S. Department of Health, Education, and Welfare,  
Office of Education, Washington 25, D.C.

National Education Association,  
1201 16th St. NW., Washington 6, D.C.

ing classes, college teachers spend considerable time preparing tests and other materials for classroom use, checking and grading students' work, and keeping up to date with developments in their specialties. Many faculty members carry on research projects, write for publication, aid in college administration, or lecture to civic and professional groups. Some professors act as consultants to business, industrial, scientific, or government organizations.

### Where Employed

More than half of all faculty members are employed by universities. The next largest number (about 20 percent) are in liberal arts colleges. Between 5 and 10 percent are employed by teachers' colleges, and roughly the same proportion are on the faculties of community (junior) colleges. The rest (fewer than 5 percent) are in technological, theological, and other professional schools.

Some States have many more colleges and universities than others, partly as a result of differences in population size. About half of all college and university teachers were employed in the following eight States, in each of which college enrollments exceeded 100,000 in 1959: New York, California, Pennsylvania,

Illinois, Massachusetts, Texas, Ohio, and Michigan.

### **Training, Other Qualifications, and Advancement**

To qualify for most beginning positions in college teaching, applicants must have at least the master's degree; and for many such positions, they must have completed all requirements for the doctorate except the dissertation. The doctor's degree is often, but not always, required for promotion or appointment to positions above the rank of instructor. The doctorate is particularly important for teaching positions in scientific fields—biological sciences, physical sciences, psychology, social sciences—as well as in philosophy and religion; it is least likely to be a requirement in the fields of business and commerce, engineering, fine arts, health and physical education, and home economics. A number of States that maintain public junior colleges require State certification for teaching in these 2-year schools. To obtain such a certificate, a teacher must have completed the master's degree and certain professional courses in education.

To enter college teaching, specialization in some subject field is usually necessary. In addition, undergraduate courses in the humanities, social sciences, and natural sciences, and the mastery of at least one foreign language are also an important part of the college teacher's educational background. Intensive instruction in the selected field of specialization is given in graduate school. During graduate work, outstanding students may be employed as part-time assistants to aid in teaching undergraduates. Such work affords valuable experience for the prospective teacher. Some colleges offer other means, such as informal seminars or meetings, by which the graduate students can develop teaching competence. A good many beginning college teachers—especially those in education departments—have had some experience in high school or other types of teaching.

Most 4-year colleges and universities recognize four academic ranks: Instructor, assistant professor, associate professor, and full professor. Few institutions grant tenure (full status as a member of the staff on a continuing basis)

or give advancement to instructors with less than 3 years of service. Advancement to assistant and associate professorship is generally restricted to candidates with extensive graduate training or teaching experience. A relatively few college teachers who have a doctor's degree and many years of teaching experience, usually from 10 to 15 years, may become professors. Outstanding achievement, generally through research or publications, often hastens advancement. In some fields, such as engineering, law, mathematics, medicine, and natural sciences, teachers of these subjects are sometimes appointed at higher ranks than other teachers with comparable experience and education.

### **Employment Outlook**

Openings for new entrants to college teaching will be numerous through the mid-1960's and will increase greatly during the latter part of the decade. Opportunities will be best for those with doctoral degrees and for those who have completed all requirements for the doctorate except the dissertation. Nevertheless, there will be many employment opportunities for new entrants with only the master's degree, particularly in junior colleges.

A great increase in college enrollment is in prospect. The number of young people in the 18- to 21-year age group will rise by 5 million during the 1960's. During the same time, it is likely that the extension of college education to a higher proportion of young people will continue—owing to rising family income, greater demand for college-trained personnel, and the increasing number and proportion of the population who finish high school and are, therefore, eligible to enroll in college. The anticipated increase in the number of community colleges and schools offering evening classes, as well as the greater availability of scholarships and other student financial aids, will also tend to make it possible for more young people to attend college. If the proportion of young people attending college continues to increase moderately and facilities are available, college enrollments are expected to increase by about 70 percent by 1970.

To handle this increase in enrollments,

thousands of additional full-time teachers will be needed annually during the 1960's. Besides the new teachers needed to take care of expanding enrollments, even larger numbers are likely to be required annually to replace persons who will retire, die, or otherwise leave the profession. The number leaving teaching each year to enter other types of employment will depend primarily on the level of business activity and on conditions in the academic profession itself. During the 1960 decade, a total of about 200,000 new teachers will be needed to take care of enrollment increases and to provide for replacement needs. Teaching innovations and technological developments also may affect the number of college teachers needed. Educational television, for example, is already in use on an experimental basis, and its expansion may enable teachers to handle larger classes efficiently in some subjects. Teaching machines that are designed to present information mechanically and to test student responses to the material covered are being considered for use as a teaching aid, where appropriate. Language laboratories that use tape recordings in foreign language instruction are being used in many colleges. Some college teachers today advocate larger classes, and more independent work on the part of students.

The supply of new college teachers is comprised largely of students receiving graduate degrees. The U.S. Office of Education estimates that the number of doctorates conferred during the 1960 decade will average about 15,000 a year, the number of master's degrees, close to 110,000 annually. It is impossible, however, to predict the proportion of graduates who will enter teaching. In 1959, when the demand was close to 20,000 new teachers, about 75,000 persons received graduate degrees; nevertheless, shortages of teaching personnel were reported in several fields, particularly in the physical sciences, engineering, and mathematics. Some increase in the supply of college teachers is anticipated because of Federal legislation enacted in 1958, which will make more fellowships available to graduate students interested in college teaching as a career. Nevertheless, it is likely that the number of well-qualified persons available for teaching positions will continue

to be insufficient to meet the demand in many subject fields throughout the 1960's. (See index for page numbers of separate statements on each profession.)

### Earnings and Working Conditions

Teachers in 4-year colleges and universities had an average salary of \$7,330 for 9 months' work in 1960-61: instructors averaged \$5,310; assistant professors, \$6,440; associate professors, \$7,590; and professors, \$9,740. Average salaries of teachers tend to be lower in community colleges, small liberal arts colleges, and women's colleges; they are highest in State universities, technological institutes, and large privately controlled universities.

According to a survey by the American Association of University Professors, average salaries in 1959-60 for teaching personnel of all ranks in 19 selected privately controlled institutions in New England and the Middle Atlantic States were as follows:

3 women's colleges .....	\$7,663
6 small institutions .....	8,447
5 medium-size institutions .....	8,785
5 large institutions .....	9,262

Faculty members who teach the year round receive higher salaries than those who are employed for the academic year only. Moreover, teachers in professional schools (medicine, dentistry, etc.) and graduate schools generally receive higher salaries than teachers in other colleges.

Some faculty members have professional income in addition to their regular salaries. The chief source of supplementary income is additional teaching (often in summer sessions) which is not a part of the teachers' regular duties. Consulting work may be a major source of extra income, particularly for teachers of engineering and physical sciences; research grants providing additional income to faculty members are now common, especially in many large, well-known universities; fees for lecturing and royalties on publications are other sources of income. Opportunities for such additional income usually increase as the faculty member gains in recognition in his field. For

the majority of college teachers, however, the additional income earned may be small.

Retirement plans differ considerably among institutions, but an increasing number of colleges and universities are participating in the Government social security program, often as an accompaniment to plans of their own. The greatest number of institutions have set 65 years as the retirement age, though nearly as many stipulate 70 years.

Many colleges and universities provide benefits such as: sabbatical leaves of absence—typically, 1 year's leave with half salary or a half year's leave at full salary after 6 or 7 years of employment in the same college; other types of leave for advanced study; life, sickness, and accident insurance; reduced tuition charges for children of faculty members; and housing allowances and other benefits.

### Where To Go for More Information

Information on college teaching as a career is available from:

U.S. Department of Health, Education, and Welfare,  
Office of Education, Washington 25, D.C.

American Association of University Professors,  
1785 Massachusetts Ave. NW., Washington 6, D.C.

American Council on Education,  
1785 Massachusetts Ave. NW., Washington 6, D.C.

National Education Association,  
1201 16th St. NW., Washington 6, D.C.

Professional societies in the various subject fields will generally provide information on teaching requirements and employment opportunities in their particular fields. Names and addresses of societies are given in the statements on specific professions. (See index for page number.)

## School Counselors

(D.O.T. 0-36.40)

### Nature of Work

School counselors help pupils to make plans for school and work and to carry out these plans and solve other personal problems. Besides counseling individuals, counselors may work with groups of students, either teaching classes in occupations or leading discussion groups. Another important part of their work is consulting with classroom teachers, school administrators, parents, and others regarding individual pupils and general guidance problems. Many work only part time as counselors and also teach classes in social studies or other subjects.

The personal interview is the basic technique used by counselors to help students understand their interests and abilities and make appropriate plans. Counselors also use psychological tests for this purpose; they may give these tests themselves or interpret those given by others. Other kinds of information often used by counselors include the school and medical records on each pupil.

Counselors in junior and senior high schools guide students in choosing career fields and

selecting courses which fit in with these plans, besides assisting them with problems related to their school and social adjustments. They help those planning to attend college to choose, and apply for admission to, colleges suited to their needs. They may also aid students in selecting other types of post-high school training, and sometimes in finding part-time work while in school, or full-time employment after leaving school. To aid pupils in making career plans, counselors maintain libraries of occupational and other information, teach classes in occupations, arrange for educational films, conduct "career day" programs, and arrange trips to factories and other business firms and to colleges. A sizable number also make followup studies of recent graduates and dropouts and cooperate in surveys of job opportunities in the community.

In elementary schools, counselors work with classroom teachers, helping them to understand and meet the needs of the individual children in their classes. These counselors also confer with parents and spend considerable time working directly with children referred for counsel-



Courtesy of U.S. Office of Education

*High school counselors inform classes about college requirements and programs.*

ing services by teachers, principals, and parents. The methods used in counseling young children necessarily differ in many respects from those used with older students. Special tests and play activity are among the techniques used with children in the lower grades.

Many people in full-time counseling jobs are called on to perform a variety of other duties, such as supervising school clubs or other extra-class activities (sometimes after regular school hours). In many schools, counselors do their own recordkeeping and other paperwork; however, an increasing number of schools are providing clerical assistance.

### Where Employed

More than 9,000 people were employed as full-time counselors in public junior and senior high schools in 1960–61, according to information from the U.S. Office of Education. About 7,500 more spent half or three-fourths of their working time, and another 12,500 spent one-fourth of their time in counseling in these schools. In addition, several thousand secondary school teachers in some parts of the country had 1 hour each week free for counseling.

No up-to-date figures are available on counselors in elementary schools. The number in these schools is known to be sizable and growing, though still much smaller than in secondary schools.

The great majority of counselors are in large city schools. An increasing number of school districts, however, employ counselors to provide guidance services in several small schools.

### Training, Other Qualifications, and Advancement

All school counselors must have State teaching certificates. Special certificates are also required for school counseling in the majority of States (as of mid-1960) and the District of Columbia. Many of these States issue counselor certificates only to people with master's degrees or the equivalent in counselor education, as well as several years of teaching experience; about half also require at least 1 year of work experience outside of teaching.

Undergraduate students interested in becoming school counselors usually take the regular program of teacher education, preferably with additional courses in psychology and sociology. After graduating from college, they can get the needed teaching experience, either before or while studying for advanced degrees in guidance. In some school systems, teachers who have completed half of the courses required for the master's degree may counsel under supervision while taking additional courses. Subjects covered by the required courses usually include the counseling process, understanding the individual, and educational and occupational information. Supervised practice in guidance is provided in many training programs. Some knowledge of statistics is necessary also for interpreting tests.

### Employment Outlook

Employment opportunities for school counselors are likely to be very good during the 1960's. A shortage of qualified counseling personnel existed in all States in 1960–61, according to the U.S. Office of Education, and this situation was expected to continue for at least several years.

Many hundreds of new counselors will probably be required each year just to replace those leaving the profession. According to recent data from the U.S. Office of Education, about 10 percent of all counselors leave the field annually because of family responsibilities, retirement, promotion to administrative jobs, or for other reasons. Counseling services will have to be expanded about 10 percent a year, on the average, during the decade just to keep pace with the growth in school enrollments. This adds up to an annual need for new counselors equivalent to a fifth of the total number currently employed, without allowing for any further strengthening of counseling services. Yet, the average ratio of counselors to students in the country as a whole is still below generally accepted standards—despite the stimulation and financial aid in strengthening school counseling programs which the Federal Government has provided to States under the National Defense Education Act of 1958. Another factor contributing to improvement in counseling services is the growing public awareness of the value of guidance services in assisting students in their occupational planning, helping them with their personal and social problems, and reducing the number of school dropouts. In addition, there is increasing recognition of the need to identify and counsel talented children at an early age, in order to help them make maximum use of their abilities in ways that will benefit both themselves and the Nation.

The extent of guidance services and of employment opportunities for counselors in different localities will continue to be related to the wealth of the community and to the priority which school administrators and the community assign to guidance services in school planning. Although communities may favor the expansion of counseling services, the necessary money may not be made available because of competing needs for funds. In recent years,

however, budget allocations for counseling activities have been increasing, and this trend is expected to continue, leading to a growing demand for counselors in most parts of the country.

### **Earnings and Working Conditions**

Many school counselors have annual earnings about \$500–\$600 higher than those of classroom teachers with comparable educational preparation and experience. (See statements on Elementary and Secondary School Teachers.) In some cases, these extra earnings are due to the fact that the counselors work 1 or 2 months longer each year than the classroom teachers. However, some school systems pay counselors an additional amount which is not dependent on the number of months they work each year.

In most school systems, counselors receive regular salary increases as their counseling experience increases and they obtain additional education. Some counselors supplement their income by part-time employment in consulting or other work with private or public counseling centers, government agencies, or private industry. Many take summer jobs, especially as teachers in counselor-training institutes.

### **Where To Go for More Information**

Information on schools and universities offering training in guidance and counseling, as well as on the certification requirements of each State, may be obtained from the State department of education at the State capital and from the U.S. Department of Health, Education, and Welfare, Office of Education, Washington 25, D.C.

Additional information on this occupation may be obtained from:

American Personnel and Guidance Association,  
1605 New Hampshire Ave. NW., Washington 9, D.C.

## HEALTH SERVICE OCCUPATIONS

Nearly everyone knows something about the professional services provided by doctors, dentists, and pharmacists. Many people also have some first-hand knowledge of the duties of nurses, attendants, and other workers who take care of patients in hospitals. Less well known, but likewise of great importance to the public health, are the large number of people employed behind the scenes in other health service occupations such as laboratory or X-ray technician. Altogether, about 2 million people were employed in the health field in 1960.

Nurses, physicians, pharmacists, and dentists make up the largest of the professional health occupations; in 1960, the numbers in these occupations ranged from about 100,000 dentists to more than 500,000 nurses. Among the smaller professional occupations are those of the medical technologist, dietitian, optometrist, chiropractor, veterinarian, and osteopathic physician. Other health service workers include technicians of various types, as well as practical nurses, hospital attendants, and nursing aids. (See p. 328.)

Workers in the health field are employed in many kinds of places including hospitals, clinics, laboratories, pharmacies, nursing homes, industrial plants, private offices, and patients' homes. Those employed in health-related occupations are concentrated in the more heavily populated and prosperous sections of the Nation and in big cities, but some are in every village and town.

Many women are employed in the health field. Nursing, the largest of the major health service occupations, is second only to teaching as a field of professional employment for women. Other health service occupations in which women also predominate are practical nurse and hospital attendant, medical X-ray techni-

cian, medical technologist, dietitian, physical therapist, occupational therapist, dental hygienist, and medical record librarian. On the other hand, the great majority of dentists, optometrists, physicians, veterinarians, and pharmacists are men.

The educational and other requirements for work in the health field are as diverse as the health occupations themselves. For example, professional health workers—physicians, dentists, pharmacists, and others—must complete a number of years of preprofessional and professional college education and pass a State licensing examination. On the other hand, some health service occupations—for example, those of practical nurse and hospital attendant—can be entered with relatively little training.

A continued expansion of employment in the health field is expected during the 1960's, although the rate of growth will differ considerably among the various health service occupations. In general, the factors which have contributed to an increase in the demand for health care in the recent past will probably continue to operate in the future. Among these factors are the country's expanding and aging population, the rising health consciousness of the general public, the extension of hospitalization and medical insurance plans, the rapid expansion of expenditures for medical research, and the continued provision of health care for veterans and members of the Armed Forces and their families. In addition, many new workers will be needed each year to replace those who retire, die, or—particularly in the case of women—leave the field for other reasons. Thus, there will be many opportunities for employment in the health field over the next decade.

## Registered Professional Nurses \*

(D.O.T. 0-33)

### Nature of Work and Where Employed

Registered professional nurses provide nursing services to patients, either by giving direct nursing care or through supervising allied nursing personnel. Because they are primarily responsible for carrying out physicians' instructions as well as having other independent duties, professional nurses are important members of the medical team. Generally, the main concerns of professional nurses are: Care of the sick and injured, prevention of illness, and promotion of good health. They perform such tasks as administering medication and treatments prescribed by a physician; observing, evaluating, and recording symptoms, reactions, and progress of patients; assisting in patient education and rehabilitation; improving the physical and emotional environment of patients; and instructing auxiliary personnel or students.

The approximately 504,000 professional nurses employed in 1960 made up the largest group of health workers; at least 90,000 of them were working part time. About 99 percent of all professional nurses are women.

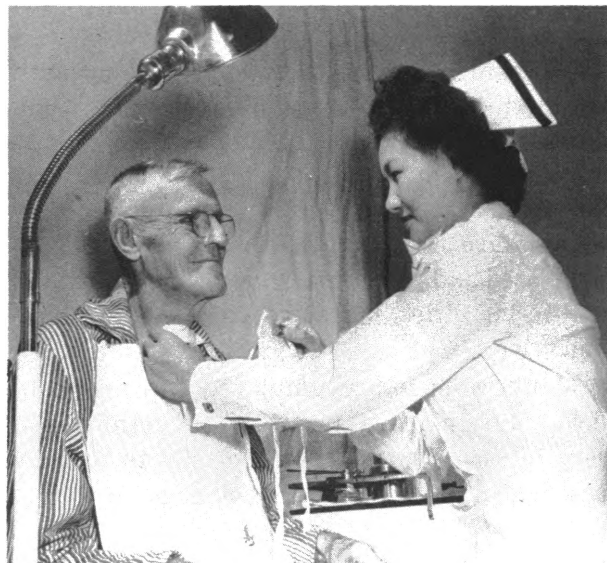
Among the several distinct groups of professional nurses specializing in a particular type of patient care and treatment, *hospital nurses* (about 64 percent of the total) make up the largest group. Employed either in hospitals or related institutions, most of these are general duty nurses, who usually perform the more skilled bedside services, such as caring for a patient after an operation, assisting with blood transfusions and intravenous feedings, and giving medications. General duty nurses often assign to auxiliary workers duties requiring less extensive training. Some hospital nurses are engaged primarily in administrative or supervisory work; others specialize in a specific type of hospital care as, for example, those employed as nurse anesthetists.

*Private duty nurses* (14 percent of the total) are employed directly by patients or their families to give individual nursing care, usually

when constant attention is needed. Private duty nurses work in hospitals and patients' homes, frequently in situations which require a good deal of independent judgment. An outgrowth of the nursing shortage and of higher hospital costs has been the recent development of group nursing plans, in which one private duty nurse may take care of as many as four patients who require special nursing care but not full-time attention.

*Office nurses* (8 percent of the total) comprise the third largest group of professional nurses. Employed mainly by physicians in private practice or in medical clinics and occasionally by dentists, office nurses assist in the care of patients; sometimes perform routine laboratory work; and may also take care of appointments, records, and other officework.

*Public health nurses* (6 percent of the total) work for public and private health agencies, including city and county health departments, and visiting nurse associations. They may care for patients in clinics and offices or visit them in their homes. In addition, some work in



Courtesy of U.S. Veterans Administration

*Professional nurses provide nursing care to the growing proportion of older people in the population.*

\* Prepared by the Women's Bureau, U.S. Department of Labor.



schools, although not all school nurses are public health nurses. The varied duties of public health nurses may include giving first aid treatment or periodic nursing care as prescribed by a physician, helping prepare booklets and charts on home health and sanitation, and demonstrating diet plans to groups of patients. Especially concerned with promoting good health and preventing disease and injury, public health nurses may work with community leaders, teachers, parents, and physicians in planning or conducting a community health education program.

Sometimes called industrial nurses, *occupational health nurses* (4 percent of all registered professional nurses) provide nursing care principally to company employees in business and industry. Responsible for promoting employee health, and thus reducing absenteeism, they may work alone (with a doctor on call), or they may be part of a health service department in a large organization. They give treatment for minor injuries and illnesses occurring at work, provide continued nursing care when indicated, arrange for further medical care if necessary, and offer health counseling. They may also assist with health examinations and inoculations, keep health records of employees, and help develop programs to prevent or control diseases and accidents.

*Nurse educators* (3 percent of the total) are employed by hospital nursing schools, colleges and universities, public vocational schools, schools of practical nursing, large medical centers, and the armed services. Their primary duty is to teach students the principles and skills of nursing, both in the classroom and at the bedside. They devise teaching methods, help beginners put nursing theory into practice, and recommend facilities and materials needed in training. They may also conduct refresher and in-service courses for nurses who need information about new drugs and improved nursing techniques.

Nurses are also engaged in numerous other specialties as, for example, performing research and analysis of nursing services, editing nursing journals or textbooks, and serving on the staffs of nursing organizations. Professional nurses employed as commissioned officers by

the Armed Forces are assigned mostly to military hospitals and dispensaries but also to military advisory groups, military field units, and air and sea evacuation services. Some social, religious, and welfare agencies; the Federal Government; and some large industrial concerns employ nurses in jobs overseas.

### **Training, Other Qualifications, and Advancement**

Three types of training programs—diploma, baccalaureate degree, and associate degree—offer the basic preparation required for professional nursing. Traditional diploma programs are conducted by hospital schools and last for 3 years. The programs leading to a bachelor's degree usually require 4 years of study in a college or university although a few require 5 years. The newer associate degree programs being introduced into an increasing number of junior and community colleges last approximately 2 years. In late October 1960, there were 1,137 programs of these three types with a total enrollment of 118,849. Included in this group were 94,812 diploma students (80 percent), 20,783 baccalaureate students (17 percent), and 3,254 associate degree students (3 percent).

Graduation from high school is required for admission to all schools of nursing. Many schools accept only graduates in the upper third or half of their class. Demonstrated competence in science and mathematics may also be required. Some schools admit only persons between 17 and 35 years of age, but in most schools the upper-age limit has been relaxed.

In all programs, nursing preparation includes classroom instruction and supervised nursing practice. Generally, nursing students begin their program by studying such subjects as anatomy, physiology, microbiology, nutrition, psychology, and basic nursing care. Subsequently, they are assigned to various hospital and health facilities and learn how to care for different types of patients. They work, for example, with medical and surgical patients, new mothers and children, orthopedic patients, and those with eye, ear, nose, and throat disorders. In many collegiate nursing schools, students are assigned also to public health

agencies and learn how to care for patients in their homes.

General education is combined with nursing education in all good schools of nursing. In baccalaureate degree programs, nursing students have a normal schedule of general academic subjects but major in nursing. The associate degree programs, which also emphasize general education, include consolidated nursing courses and a minimum of repetitive nursing practice.

Tuition and other educational expenses vary widely among schools of nursing, ranging from no cash outlay to \$2,000 a year. In some hospital schools, services performed for the hospital by the nursing students compensate for all or part of the training costs. Colleges and universities, on the other hand, charge their regular fees for a full college curriculum. Tuition at junior and community colleges is usually less expensive than in other colleges and universities. Scholarships and loans for nursing education are available from nursing schools; colleges and universities; and business, professional, civic, and social groups. In the armed services, various educational plans have been established for nurses. The Army gives reserve status to either diploma or baccalaureate program students and finances their last 1 or 2 years of training. The Navy admits only baccalaureate candidates to a similar type program during their final year and, in addition, selects qualified enlisted women for collegiate nursing education.

For graduate study in nursing administration, supervision, or education, as well as for public health work, financial assistance is available through a Federal program administered by the United States Public Health Service and through many private and public agencies. The armed services also offer opportunities for graduate study at colleges and universities.

A license is needed to practice professional nursing within each State. To obtain a license, a nurse must have graduated from a school approved by the State board of nursing and must pass a State board examination. All State boards use a uniform examination prepared in cooperation with the National League for Nursing, but each State sets its own passing grade.

A nurse may be registered in more than one State either by examination or endorsement of a license issued by another State. Examination and endorsement fees range from \$5 to \$30, depending upon the State.

Persons interested in a nursing career should have a genuine interest in people and a desire to care for the sick and injured. Other personal traits needed are dependability, patience, cooperativeness, human understanding, and sympathy. In addition, a nurse must be in good physical and mental health. For a better understanding of the basic requirements and opportunities in nursing, students may join one of the 3,500 Future Nurses Clubs found in approximately one-eighth of the Nation's high schools. These clubs, as well as other service organizations, arrange for volunteer work in hospitals. If adequately supervised, such experience offers a good opportunity to test one's personal qualifications and gain a first-hand picture of nursing.

Hospital nursing usually begins with general duty work, from which nurses may advance to progressively more responsible supervisory positions, such as head nurse, supervisor, assistant director, and director of nursing service. A bachelor's or master's degree, however, is customarily required for supervisory and administrative positions, as well as for the fields of nursing education and public health nursing. Because of the shortage of degree nurses, however, some public health agencies are hiring staff nurses who lack training in public health nursing, but advancement in these agencies is frequently limited without at least a bachelor's degree. In other nursing fields, advanced education in a functional speciality (administration or teaching) or in a clinical speciality (medical or surgical nursing, pediatrics, obstetrics, or psychiatry) also increases the chances for promotion to more specialized and responsible positions.

### **Employment Outlook**

During the 1960's, the demand for professional registered nurses will continue to advance rapidly. For the growing population, a total of 585,000 nurses will be required by

1970 to maintain the present ratio of 282 nurses for every 100,000 people. If the more desirable ratio of 300 nurses per 100,000 population is to be attained, more than 600,000 nurses will be needed. In addition to population growth, the principal reasons for the rising demand for nurses are: Improved economic status of the population, widespread membership in hospital and medical insurance plans; expansion of medical services as a result of new medical techniques and drugs; increased interest in preventive medicine and rehabilitation of the handicapped; and growing proportions of young and elderly persons in the population. A sizable number of openings also arise because of replacement needs. About 5 percent of the nurses are estimated to leave the profession each year, primarily because of marriage and family responsibilities.

At present, not enough students are entering the nursing field to meet growth and replacement needs. In 1960, student admissions totaled 49,787. However, about one-third of those who enter nursing schools usually do not complete the course. During the school year 1959-60, a total of 30,113 nurses were graduated from basic training programs. In addition, 2,301 graduate nurses obtained a bachelor's degree and 1,197 a master's degree. If 5 percent of the college-age women continue to enter professional nursing schools, it is estimated that annual admissions will reach 75,000 by 1970 and annual graduations, about 48,000.

The future outlook is especially favorable for nurses with graduate training in education and administration. The growing demand for well-trained nursing specialists with a master's or doctor's degree reflects the rapid advances in medical drugs, techniques, and equipment; the need for more supervisors or administrators to gain the optimum assistance of auxiliary personnel in providing nursing services; and the creation of more teaching positions in new or expanding programs for training professional and practical nurses.

### Earnings

Minimum starting salaries of general duty nurses employed by hospitals in 15 metropoli-

tan areas ranged from \$55 to \$100 a week in mid-1960. According to the same survey, average salaries of general duty nurses (including both beginning and experienced nurses) ranged from \$65 a week in Atlanta to \$89 a week in the Los Angeles-Long Beach area. Head nurses averaged about 10 to 19 percent more than general duty nurses and supervisors of nurses and nursing instructors averaged about 20 to 31 percent more.

Private duty nurses generally charged between \$14 and \$18 for a basic 8-hour day in 1959, according to the American Nurses' Association (ANA). Average salaries of local public health nurses in 1959 were \$4,408 in official (public) agencies and \$4,042 in nonofficial (private) agencies, as indicated by a National League for Nursing study. At the same time, staff nurses employed by boards of education averaged \$5,267 a year. Office nurses earned \$3,600 a year on the average when surveyed by the ANA in June 1958.

Occupational health (industrial) nurses averaged from \$73 a week (or \$3,796 a year) in Providence, R.I., and Greenville, S.C., to \$111.50 a week (or \$5,798 a year) in the Beaumont-Port Arthur, Tex., area, among 54 metropolitan areas surveyed between July 1959 and June 1960.

Nurse educators and administrators had an average (median) salary of \$4,680 when surveyed by the American Nurses' Association in 1958. Teachers in hospital schools received \$4,500, and those in collegiate schools, \$5,200.

In the Federal Government, the entrance rate in 1961 was \$4,345 for graduates of a 3-year training program or for those of a 2-year school with 1 year of experience or additional nursing education. The Veterans Administration, which employs about 14,400 nurses, hired diploma and associate degree graduates in the junior grade at salaries ranging from \$4,760 to \$5,790 and baccalaureate graduates in the associate grade, from \$5,600 to \$6,630. For nurses having 1 year of graduate education and 1 year of experience in public health nursing, the Federal starting salary was \$5,355; the majority of public health nurses earned salaries ranging from this amount to \$7,425 a year. Beginning salary in 1961 for nurse officers

(second lieutenants and ensigns) in the military services and also in the commissioned corps of the U.S. Public Health Service ranged from \$4,063 (including rental and food allowance) to \$5,513, depending upon experience and education.

Virtually all nurses receive extra pay for work on evening or night shifts and at least 2 weeks of paid vacation after 1 year of service. Most hospital nurses receive from 5 to 13 paid holidays a year and also some type of health and retirement benefits.

### Where To Go for More Information

Additional information about professional nursing as a career is available in a publica-

tion of the U.S. Department of Labor, Women's Bureau, *The Outlook for Women in Professional Nursing Occupations*, Bull. 203-3, Revised, 80 pp. Washington, D.C., 1953. Price 30 cents.

Information on education for nursing, approved schools of nursing, nursing careers, Future Nurses Clubs, and scholarships may be obtained from:

National League for Nursing, Committee on Careers,  
10 Columbus Circle, New York 19, N.Y.

Information on salaries, working conditions, and employment opportunities may be obtained from:

American Nurses' Association,  
10 Columbus Circle, New York 19, N.Y.

## Physicians

(D.O.T. 0-26.10)

### Nature of Work

Physicians diagnose diseases and treat people who are ill or in poor health. In addition, they are concerned with the prevention of disease and with the rehabilitation of people who are injured or ill.

Physicians generally examine and treat patients in their own offices and in hospitals, but they also visit patients at home when necessary. Some physicians combine the practice of medicine with research or college teaching. Others hold full-time research or teaching positions or perform administrative work in hospitals, professional associations, and other organizations. A few are primarily engaged in writing and editing medical books and magazines.

Almost half the physicians engaged in private practice are general practitioners—often referred to as “family doctors”; the others are specialists in 1 of the 32 fields recognized by the medical profession. In recent years, there has been a marked trend toward specialization. Among the largest specialties are surgery, internal medicine, pediatrics (medical care of children), pathology (diagnosing changes in body tissues), obstetrics (childbirth), gynecology (women's diseases), psychiatry (mental disorders), radiology (use of X-ray, radium, and

other radioactive sources), ophthalmology (the eye and its diseases), and otolaryngology (diseases of the ear, nose, and throat).

### Where Employed

Nearly 235,000 physicians were professionally active in the United States in mid-1960.



Courtesy of National Institutes of Health  
*Surgeon performing an operation, assisted by a medical team.*

The great majority—over 170,000—were engaged in private practice. More than 30,000 were interns or residents in hospitals, and another 18,000 held regular positions on hospital staffs. Sizable numbers of physicians were serving as commissioned officers in the Armed Forces or were employed in Federal Government agencies, chiefly in the hospitals and clinics of the Veterans Administration and the Public Health Service. The remainder were employed in private industry, State and local health departments, medical schools, research foundations, and professional organizations.

In 1960, nearly 40 percent of all physicians were in the five States with the largest population: New York, California, Pennsylvania, Illinois, and Ohio. In general, the Northeastern State have the highest ratio of physicians to population and the Southern States, the lowest. As a rule, general practitioners were much more widely distributed geographically than specialists, who were concentrated in big cities.

### **Training and Other Qualifications**

A license to practice medicine is required in all States and the District of Columbia. To qualify for a license, a candidate must graduate from an approved medical school, pass a licensing examination, and—in 37 States and the District of Columbia—serve a 1-year hospital internship. As of 1960, 13 States permit a physician to be licensed immediately after graduation from medical school, but even in these States an internship is always necessary for acceptance by the profession. Twenty-one States and the District of Columbia require candidates to pass an examination in the basic sciences to become eligible for the medical licensing examination.

Licensing examinations are given by State boards. The National Board of Medical Examiners also gives an examination which is accepted by most States as a substitute for State examinations. Although physicians licensed in one State can usually obtain a license to practice in another without further examination, some States limit this reciprocity.

In 1960, there were 86 schools in which students could begin the study of medicine.

Eighty-one awarded the degree of doctor of medicine (M.D.) to those completing the 4-year course; 3 offered 2-year courses in the basic sciences to students who could then transfer to regular medical schools for the last 2 years of study. The two remaining schools (set up as 4-year institutions) had not yet graduated their first class and were, therefore, only provisionally approved. Every year, more young people apply to medical schools than can be admitted. In recent years, however, the ratio of applicants to medical school openings has been declining and many medical schools have reported a need for a greater number of highly qualified candidates.

Most medical schools require applicants to have completed at least 3 years of college education for admission and a few require 4 years. The great majority of students (over 80 percent in 1960) entering medical schools have completed 4 years of college. A few medical schools allow selected students with exceptional qualifications to begin their professional study after completion of 2 or 3 years of college. These students are usually awarded a bachelor's degree while in medical school.

Premedical study must include courses in English, physics, biology, and inorganic and organic chemistry in an accredited college. Students are also encouraged to acquire a broad general education by taking courses in the humanities, mathematics, and the social sciences. Other factors considered by medical schools in selecting students include the individual's college record; the standing of the college where his premedical work was taken; and his score on the Medical College Admission Test, which is taken by almost all applicants. Consideration is also given to the applicant's character, personality, and leadership qualities, as shown by personal interviews, letters of recommendation, and extracurricular activities in college. In addition, many State-supported medical schools give preference to residents of their particular States and, sometimes, nearby States.

The first 2 years of medical training are spent in laboratories and classrooms learning basic medical sciences, such as anatomy, biochemistry, physiology, pharmacology, microbiology,

and pathology. During the last 2 years, students spend most of their time in hospitals and clinics under the supervision of experienced physicians and learn to take case histories, perform examinations, and recognize diseases.

New physicians are increasingly taking training beyond the 1-year hospital internship. Those who plan to be general practitioners often spend an additional year as interns or residents in a hospital. To become recognized as specialists, physicians must pass specialty board examinations. To qualify for these examinations, they must spend from 2 to 4 years—depending on the specialty—in advanced hospital training as residents, followed by 2 or more years of practice in the specialty. Doctors interested in teaching and research may take graduate work leading to the master's or Ph.D. degree in a field such as biochemistry or microbiology.

A growing number of United States citizens are studying medicine in foreign countries (over 350 who received their training abroad were licensed by 23 States in 1959). To be appointed to approved internships or residencies in U.S. hospitals, however, graduates of foreign medical schools (citizens of foreign countries as well as U.S. citizens) must pass the American Medical Qualification Examination given by the Educational Council for Foreign Medical Graduates.

Among the personal qualifications needed for success in this profession are a strong desire to become a physician, above-average intelligence, and an interest in science. In addition, prospective physicians should possess good judgment, be able to make decisions in emergencies, and have emotional stability. Although some aspects of the physicians' practice may appear to be glamorous or dramatic, much of their work involves dealing with human tragedy.

The majority of newly qualified physicians open their own offices. New graduates entering the Armed Forces are usually commissioned as first lieutenants or lieutenants (j.g.) and can rise to higher ranks if they make military service a career. Graduates of accredited medical schools are eligible for Federal Civil Service positions and for commissions in the U.S. Public Health Service.

### Employment Outlook

Excellent opportunities are anticipated for physicians in the 1960's. The number of medical school graduates is expected to increase moderately. Many medical schools have recently expanded their facilities and a few new schools are being planned. The number of graduates will, therefore, rise from about 7,000 in 1960 to more than 7,400 by 1965. Moreover, graduates of foreign medical schools may continue to add to the supply—in 1959, over 1,800 foreign-trained physicians were licensed in the United States. On the other hand, about 4,500 new doctors will be needed each year to replace those who retire or die. The remaining number will not be sufficient even to maintain the current ratio of physicians to population, at least until 1965. According to the U.S. Public Health Service, the shortage of physicians will become more critical unless training facilities are greatly expanded.

A steady increase in demand for physicians' services is in prospect in both the near future and the long run. The need for medical services will be increased by the anticipated growth and change in the age composition of the population, the rising health consciousness of the public, and the trend toward higher standards of medical care. Extension of prepayment plans for medical care and hospitalization, continued Federal Government provision of medical care for veterans and for members of the Armed Forces and their families, and the continuing growth in the fields of public health, rehabilitation, industrial medicine, and mental health will also tend to bring about a need for more doctors. In addition, expanded medical research activities will require more trained investigators; medical schools will have openings for additional faculty members; and the growing number of hospital training programs will require more interns and resident physicians.

The rise in demand for physicians' services will be limited to some extent by advances in medical science and more efficient use of medical personnel. The introduction of new drugs and medical techniques, the more extensive use of assistants trained in other health occupations, and the increasing proportion of patients

treated in hospitals rather than at home will probably enable individual physicians to care for more patients. Improved roads and transportation facilities as well as the movement of people to urban areas will continue to decrease the time needed to make house calls. In addition, the growing tendency of doctors to work in groups is expected to result in a more effective use of the physician's time. Nevertheless, population expansion and the general rise in use of medical services are expected to outweigh any lessening in demand for physicians arising from other developments. For all these reasons, the long-run outlook is very bright for young people who have proper qualifications and are able to gain admittance to medical school.

Women physicians, who represent about 6 percent of the profession, will continue to find good opportunities as general practitioners and as specialists. In 1960, about 6 percent of all medical school students were women. Three schools had no women students; one school accepted only women.

### **Earnings and Working Conditions**

New graduates serving as interns in 1960 had an average (median) stipend, during this training period, of \$166 a month in hospitals affiliated with medical schools and \$207 a month in other hospitals. In many cases, interns also received room, board, and other maintenance. The average stipend of residents during 1960 was \$203 a month in hospitals affiliated with medical schools, and \$242 a month in non-affiliated hospitals. Many hospitals also provided full or partial room, board, and maintenance allowances. During the first year or two of independent practice, physicians may earn little more than the minimum needed to pay

expenses but, as a rule, their earnings rise rapidly as their practice develops.

According to a survey made by a private organization in mid-1955, the average (median) income above business expenses of family physicians was approximately \$15,000. About one-fifth of the family physicians had net incomes of less than \$10,000; nearly half netted between \$10,000 and \$20,000; and one-third netted \$20,000 or more. Although later information is not available, incomes of family physicians have probably increased since 1955.

Earnings of individual physicians depend on factors such as size of community and region of the country in which the practice is located, income level of the patients, and the physician's skill and personality as well as his length of experience. Physicians engaged in private practice usually earn more than those in salaried positions, and specialists usually earn considerably more than general practitioners.

Many physicians work long and irregular hours. Most specialists work fewer hours each week than general practitioners. As doctors grow older, they tend to work shorter hours. Many, however, continue in practice well beyond 70 years of age.

### **Where To Go for More Information**

Persons wishing to practice in a given State should find out about the requirements for licensure directly from the board of medical examiners of that State. Lists of approved medical schools, as well as general information on premedical education and medicine as a career, may be obtained from:

Council on Medical Education and Hospitals,  
American Medical Association,  
535 North Dearborn St., Chicago 10, Ill.

Association of American Medical Colleges,  
2530 Ridge Ave., Evanston, Ill.

## **Pharmacists**

(D.O.T. 0-25.10)

### **Nature of Work**

Pharmacists help to protect people's health by making drugs and medicines available and

providing information on their use. They fill prescriptions written by physicians and other medical practitioners and also sell many medi-



*Pharmacists follow doctors' instructions in compounding prescriptions.*

cines which can be bought without prescriptions. Pharmacists must understand the composition and effects of drugs and be able to test them for purity and strength. Compounding—the actual mixing of ingredients to form powders, pills, capsules, ointments, and solutions—is only a small part of present-day pharmacists' work, since many drugs are now produced by manufacturers in the form used by the patient.

Many pharmacists in retail drug stores have sales and managerial as well as professional duties. Besides dispensing drugs, these pharmacists may hire and supervise salesclerks and buy and sell many other kinds of merchandise. Some retail pharmacists, however, operate prescription pharmacies which sell only drugs and medical supplies. Pharmacists in hospitals fill prescriptions and advise the medical staff on the selection and effects of drugs; they may also make sterile solutions, buy medical supplies, teach in schools of nursing, and perform administrative duties. Some pharmacists, employed as "detail men" by drug manufacturers and wholesalers, inform doctors and dentists about new drugs and sell medicines to other pharmacists. Others teach in colleges, perform

research, supervise the manufacture of pharmaceuticals, develop new drugs, write for pharmaceutical journals, or do administrative work.

### **Where Employed**

About 104,000 of the 117,000 registered pharmacists in early 1960 worked in drugstores, according to the National Association of Boards of Pharmacy. About half of these 104,000 retail pharmacists owned their drugstores, alone or as members of a partnership, and the others were salaried employees. Of the remaining 13,000 pharmacists, the greatest number were employed by pharmaceutical manufacturers and wholesalers, and the next largest number worked for hospitals. Approximately 750 were civilian employees of the Federal Government, working chiefly in hospitals and clinics of the Veterans Administration and the U.S. Public Health Service. In addition, some served as pharmacists in the Armed Forces, taught in colleges of pharmacy, or worked for other employers such as State and local government agencies.

Nearly every small town has at least one drugstore with one or more pharmacists in attendance. Most members of the profession, however, are employed in or near big cities and in those States which have the greatest population.

### **Training, Other Qualifications, and Advancement**

A license to practice pharmacy is required in all States and the District of Columbia. To obtain a license, one must be a graduate of an accredited pharmacy college, pass a State Board examination and, in most States, also have 1 year of practical experience under the supervision of a registered pharmacist. In 11 States, part or all of this experience must be acquired after graduation. All States except California, Florida, Hawaii, and New York grant a license without an examination to properly qualified pharmacists already licensed by another State.

In 1960, there were 75 accredited pharmacy colleges in the United States. Some of these were not filled to capacity and qualified applicants could usually expect to be accepted.



To graduate from a pharmacy college, one must have at least 5 years of study beyond high school; two schools require a longer period of education. Some pharmacy colleges with a 5- or 6-year course admit students directly from high school and provide all the education necessary for graduation. Other pharmacy schools provide 3 or 4 years of professional instruction and require all entrants to have completed their prepharmacy education in an accredited college or university. Prepharmacy education usually emphasizes mathematics and basic sciences, such as chemistry and biology, but also includes courses in the humanities and social sciences.

The bachelor's degree awarded upon graduation from a pharmacy college is sufficient educational qualification for most positions in the profession. However, the master's or Ph. D. degree in pharmacy or a related field—such as pharmaceutical chemistry, pharmacology (the study of the effects of drugs on the body), pharmacognosy (the study of the drugs derived from plant or animal sources), or pharmacy administration—is usually required for research work or college teaching. Graduate study is also considered desirable for pharmacists planning to work in hospitals. Those interested in becoming hospital pharmacists can sometimes secure 1- or 2-year internships which combine graduate study and practical experience in a hospital pharmacy.

Prospective pharmacy students should have a good high school background in mathematics and science. In addition, orderliness and a liking for detail are desirable qualities for young people entering the profession. For those planning to become retail pharmacists, the ability to deal with people and manage a business is of special importance.

Pharmacists often begin as employees in retail pharmacies. After obtaining some experience and the necessary funds, they may open their own pharmacies or buy established drugstores. A pharmacist who gains experience in a chain drugstore may advance to store manager and, later, to a higher executive position within the company. Hospital pharmacists with the necessary training and experience may advance to administrative positions.

### Employment Outlook

Most new pharmacy graduates are expected to find employment readily through the mid-1960's. From 3,000 to 4,000 openings will arise each year as pharmacists retire, die, or transfer out of the profession. These openings, together with the anticipated gradual increase in new positions for pharmacists, are expected to provide enough jobs to absorb each year's graduates. In early 1961, employers in some localities were having difficulty in meeting their needs for pharmacists, and not enough people with graduate degrees in pharmacy and related fields were available for college teaching and laboratory research positions.

In the long run, a moderate increase in employment of pharmacists is expected. The country's expanding population—especially the growing number of old people and children—and the rising standard of medical care point to an ever-increasing demand for pharmacists' services. Some drug stores will be added, particularly in new residential areas or suburban shopping centers, and the trend toward bigger drugstores is expected to continue. The number of salaried positions for pharmacists will therefore increase and these pharmacists will spend more of their time in professional activities. The trend toward larger drugstores, however, may lessen the overall demand for retail pharmacists. Nevertheless, in view of the trend toward shorter working hours, many drugstores will hire additional pharmacists. Continued expansion in pharmaceutical manufacturing and research is expected to provide more opportunities for pharmacists not only in production and research but also in distribution and sales positions. Employment in hospitals will probably rise significantly with the construction of additional facilities and the more extensive use of pharmacists for hospital work. In both the pharmaceutical industry and hospitals, the demand will be greatest for pharmacists with graduate education.

Thus, many factors point toward continuous growth in this profession. It should be borne in mind, however, that employment of pharmacists is closely related to the prosperity of the retail drug industry which, in turn, de-

pends to a large degree on the general level of economic activity.

Women, who represent about 7 percent of all pharmacists, will continue to find their best opportunities in hospital pharmacies, prescription pharmacies, and in laboratory work, although some are employed in all branches of the profession. Women students are accepted by all colleges of pharmacy and, in 1960, constituted about 12 percent of undergraduate enrollments.

### **Earnings and Working Conditions**

Beginning pharmacists employed in drugstores often earned between \$125 and \$150 a week in 1960, according to reports from cities in various parts of the country. Pharmacists who owned and operated drugstores generally made more than this; however, their earnings, and also to a lesser extent those of salaried pharmacists, are greatly affected by the length of their workweek, the size and geographic location of the store, and many other factors. Beginning pharmacists employed in hospitals and drug manufacturing firms generally earned from \$5,000 to \$6,500 a year. The entrance salary for pharmacists in the Federal Civil Service was \$5,355 a year in early 1961; however, pharmacists with a year of experience could start at \$6,435.

Retail pharmacists generally work more than the standard 40-hour week. Drugstores are often open in the evenings and on weekends and all States require a registered pharmacist to be in attendance during store hours. Despite the trend toward shorter hours, 45 or 48 hours is still the basic week for many salaried retail pharmacists, and some work 50 or more hours a week. Self-employed pharmacists often work more hours than those in salaried positions. Those who teach or work for industry, Government agencies, or hospitals have shorter workweeks.

### **Where To Go for More Information**

Information on pharmacy as a career may be obtained from:

American Pharmaceutical Association,  
2215 Constitution Ave. NW., Washington 7, D.C.

A list of accredited colleges may be obtained from:

American Council on Pharmaceutical Education,  
77 West Washington St., Chicago 2, Ill.

Current requirements for licensure in a particular State may be obtained from the Board of Pharmacy at the State capital. Information on college entrance requirements, curriculums, and scholarships is available from the dean of any college of pharmacy.

## **Dentists**

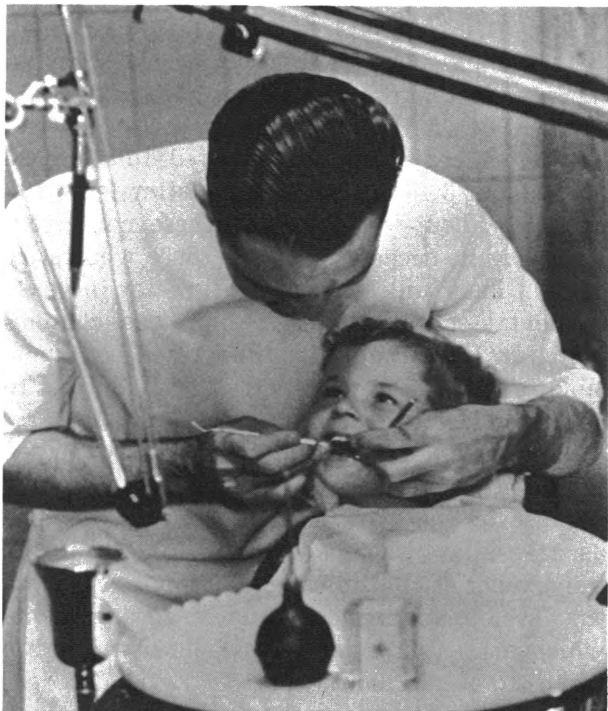
(D.O.T. 0-13.10)

### **Nature of Work**

Dentists look for and fill cavities in the teeth, straighten teeth, take X-rays of the mouth, and treat gum diseases. Dentists also extract teeth and substitute artificial dentures especially designed for the individual patient. In addition, they clean teeth and examine the mouth for diseases that may affect a patient's general health. Dentists spend most of their time with patients, but they also devote some time to laboratory work—making dentures, inlays, and other dental appliances. Many dentists, however—particularly those in large cities—send most of their laboratory work to

commercial firms. Some dentists also employ dental hygienists who clean patients' teeth.

Most dentists are general practitioners who provide many types of dental care; only about 4 percent are recognized as specialists. Approximately half of these specialists are orthodontists, who straighten teeth. The next larger number, oral surgeons, perform operations on the mouth and jaws. The remainder specialize in periodontology (treating the tissues that support the teeth), prosthodontics (making artificial teeth or dentures), pedodontics (children's dentistry), oral pathology (diseases of the mouth), and public health dentistry.



*Some dentists specialize in the care of children's teeth.*

A few dentists—about 3 percent of the total number—are primarily employed in work that does not involve “chairside” practice, such as teaching and research. Many dentists in private practice, however, do this work on a part-time basis.

### **Where Employed**

About 93,000 dentists were at work in the United States in mid-1960. Nine out of every 10 were in private practice. Of the remainder, about 5,500 served as commissioned officers in the Armed Forces; about 1,200 had other types of Federal Government positions—chiefly in the hospitals and clinics of the Veterans Administration and the Public Health Service; and about 1,800 held full-time positions in schools, hospitals, or State and local health agencies. Women dentists represented only about 2 percent of the profession.

Dentists are concentrated in large cities and in a few States. In 1959, 40 percent of the dentists were in the 4 most populous States (New York, California, Pennsylvania, and Illinois), whereas 21 States had less than 10 per-

cent. The region including Delaware, the District of Columbia, Maryland, New Jersey, New York, Pennsylvania, and West Virginia had the highest ratio of dentists to population, with one dentist for every 1,429 persons in 1959. New England had the second highest ratio and the Far West, the third. At the other extreme was the Southeast with an average of only one dentist for every 2,850 residents in 1959.

### **Training, Other Qualifications, and Advancement**

A license to practice dentistry is required in all States and the District of Columbia. To qualify for a license, a candidate must be a graduate of an approved dental school and pass a State Board examination. Many States (33 in 1960) and the District of Columbia recognized the examination given by the National Board of Dental Examiners as a substitute for the written part of the State Board examinations. One State, Delaware, also requires new graduates to serve 1 year of hospital internship. Most State licenses permit dentists to engage in both general and specialized practice. In 10 States, however, a dentist cannot call himself a “specialist” unless he has been licensed as such after passing a special State examination. Few States permit dentists licensed in other States to practice in their jurisdictions without further examination.

Two years of pre-dental college work followed by 4 years of professional training in a dental school are the minimum educational requirements for the profession; 7 of the 46 dental schools in operation in the United States in 1960 required 3 years of pre-dental study. Pre-dental education must include at least a half-year course in organic chemistry and full-year courses in English, biology, physics, and inorganic chemistry.

In dental college, the first 2 years are usually devoted to classroom instruction and laboratory work in basic sciences such as anatomy, bacteriology, and pharmacology. The last 2 years are spent chiefly in the school's dental clinic, treating patients. The degree of Doctor of Dental Surgery (D.D.S.) is awarded by most dental colleges; the degree of Doctor of Dental Medi-

cine (D.M.D. or D.D.M.) is conferred by a few schools.

Dentists interested in research or teaching often take graduate work in one of the basic sciences. To become recognized as a certified specialist, a dentist must pass specialty board examinations. To qualify for these examinations, he needs 2 or 3 years of graduate education and several years of specialized experience. Graduate training may be obtained at graduate schools of dentistry and also by serving an internship or residency at 1 of the 218 approved hospitals that offer these programs.

Keen competition exists for admittance to dental schools. In selecting students, dental schools give considerable weight to college grades and amount of college education; nearly 80 percent of the students enrolled in 1959 had at least 3 years of college education and about 45 percent had bachelor's degrees. In addition, all dental schools participate in a nationwide dental aptitude testing program, and scores earned on these tests are considered along with information gathered about the applicant through recommendations and interviews. Many State-supported dental schools also give preference to residents of their particular States.

The profession of dentistry requires both manual skills and a high level of intelligence. Dentists should have good visual memory, excellent judgment of space and shape, delicacy of touch, and a high degree of manual dexterity, as well as scientific ability. A liking for people and a good business sense are helpful in achieving success in private practice.

The majority of newly qualified dentists open their own offices or purchase established practices. Some start in practice with dentists who are already established to gain experience and to save the money required to equip an office; others may enter residency or internship training programs in approved hospitals. Dentists entering the Armed Forces are commissioned as first lieutenants or lieutenants (jg) and may progress to higher ranks. Graduates of recognized dental schools are eligible for Federal Civil Service positions and for commissions in the U.S. Public Health Service.

### Employment Outlook

The demand for dental services is likely to increase faster than the supply of new dentists in the 1960's. Although the number of dentists graduated each year is expected to increase from about 3,100 in 1959 to an estimated 3,700 by 1956, about two-thirds of these new graduates will be needed to replace those who retire or die. Thus, unless there is a greater increase in dental school facilities than was contemplated in 1960, it appears that it will be impossible to retain the present ratio of dentists to population over the next decade.

The demand for dental services is expected to increase steadily over the long run—not only because of the growth in population but also as a result of the growing awareness of the importance of obtaining regular dental care and the development of new payment arrangements which makes it easier for people of moderate means to obtain dental service. Expanded dental research activities will require more trained personnel; dental public health programs will need qualified administrators; and dental colleges will have openings for additional faculty members. A number of dentists will continue to serve in the Armed Forces. Although better dental hygiene and fluoridation of community water supplies may prevent some tooth and gum disorders, such measures—by preserving teeth that might otherwise be extracted—may tend to increase rather than decrease the demand for dental care over the long run.

Individual dentists will be able to care for more patients as a result of the introduction of new techniques, equipment, and drugs as well as more extensive and effective use of dental hygienists, assistants, and laboratory technicians. These developments, however, will not offset the need for dentists for the reasons discussed earlier.

Location is one of the major factors in determining success of dentists who open their own offices. For example, people who are well educated and well paid are most likely to visit dentists regularly. Also, a practice can be developed most quickly in small towns where the new dentists can easily become known and where there is less competition with established practitioners. Although the income from prac-

tice in small towns may rise rapidly at first, over the long run the level of earnings may be lower than that in larger communities.

### Earnings and Working Conditions

During the first year or two of practice, dentists often earn little more than the minimum needed to cover expenses, but their earnings rise rapidly as their practice develops. In 1958, average income above expenses for all self-employed dentists was about \$14,300 a year, and nearly \$10,000 for all salaried dentists, according to an American Dental Association survey. About 50 percent of all dentists earned between \$9,000 and \$18,000 annually; 25 percent earned less than \$9,000; and 25 percent earned more than \$18,000. About 4 percent of all dentists reported incomes of \$30,000 or more. Specialists generally earned considerably more than general practitioners, with orthodontists reporting the highest average incomes.

Dentists in the Far West and South had higher average incomes than those in other parts of the country. Dentists' incomes tended to be lowest in New England and the Middle

Atlantic States. Practitioners in cities of 50,000 to 500,000 population earned more, on the average, than those in larger or smaller cities. Most dental offices are open 5 days a week and some dentists have evening hours. Dentists work an average of about 43 hours a week, although almost one-fifth of those surveyed in 1958 reported they spent 50 or more hours a week in the office. Many dentists work fewer hours as they grow older, since the hours of work are usually determined by the dentist himself. A considerable number continue in part-time practice well beyond the usual retirement age.

### Where To Go for More Information

People wishing to practice in a given State should find out about the requirements for licensure directly from the board of dental examiners of that State. Lists of State boards and of accredited dental schools, as well as information on dentistry as a career, may be obtained from:

American Dental Association, Council on Dental Education,  
222 East Superior St., Chicago 11, Ill.

## Medical X-Ray Technicians \*

(D.O.T. 0-50.04)

### Nature of Work

Medical X-ray technicians perform a variety of duties related to the utilization of X-ray equipment. These duties are in two major areas of work—diagnostic and therapeutic.

Most technicians perform *diagnostic* X-ray work, using X-ray equipment to take pictures of internal parts of the body which the doctor wishes to examine. This equipment is also used to detect the presence of foreign matter or an injury and to discover malformation or malfunctioning of various parts of the body.

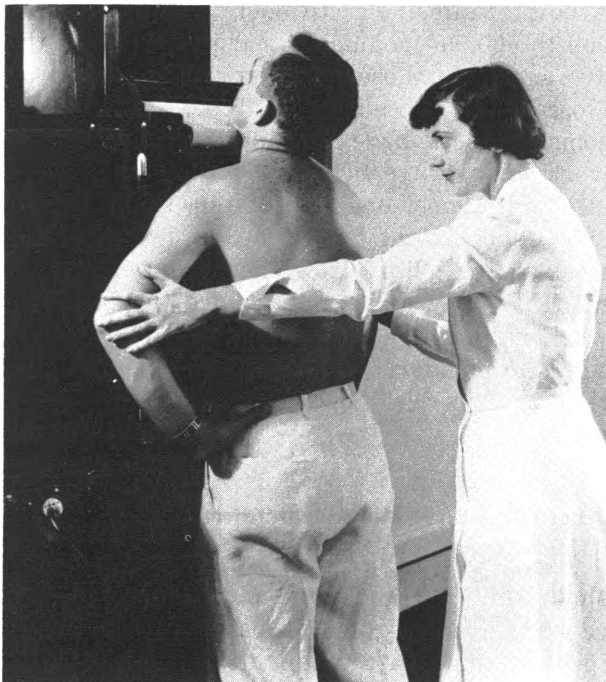
To prepare for X-ray, technicians position patients between the X-ray tube and the film and cover body areas which are not to be exposed to the rays with a protective lead plate. When

necessary, they set up or adjust devices which prevent the patient from moving. In taking X-rays (radiographs), technicians determine the proper voltage, current, and exposure time and regulate the controls to obtain film of high technical quality for interpretation by the physician.

Diagnostic technicians may also assist physicians in fluoroscopy or other special types of X-ray work. They may prepare a prescribed X-ray "opaque," such as barium salts, which the patient swallows in order to shade various portions of the anatomy to provide proper visibility for X-ray purposes. The actual fluoroscopic process, however, is conducted by the physician.

Other technicians are concerned with *therapeutic* X-ray work. They operate special X-ray

\* Prepared by the Women's Bureau, U.S. Department of Labor.



Courtesy of National Institutes of Health

*X-ray technician positioning a patient for a chest X-ray.*

equipment used for treatment of certain diseases, including various types of cancer and tissue infections. After placing the patient in the proper position, these technicians operate the equipment from an adjoining room. They may also assist radiologists—physicians who are specialists in the use of X-rays—in the preparation of radium and other radioactive materials. (Radium gives off “gamma” radiations which are similar to X-rays.)

Some technicians perform duties and follow work procedures involved in both diagnostic and therapeutic X-ray work.

Other duties of X-ray technicians may include processing film and keeping records of services performed for patients. In a large institution, such tasks are usually assigned to a darkroom assistant or clerk. Some X-ray technicians may be expected to operate other kinds of apparatus, such as equipment used in diagnosing heart disease or brain damage or that used for determining basal metabolism. Usually, they are expected to keep the X-ray equipment in good working order by cleaning it and making minor repairs.

Chief technicians may be expected to in-

struct nurses, interns, and students in X-ray technique, in addition to their usual duties.

Most technicians are given a wide range of job assignments, but some tend to specialize in a particular phase of the work. For example, a technician working in a dental clinic might specialize in dental X-ray, or one in a tuberculosis hospital might specialize in chest X-ray.

A few of these workers, called radioisotope technicians, work in the new and expanding field of atomic medicine. These technicians assist scientists in conducting certain experiments with specially treated chemical elements that trace the course of foods or chemicals through the body. The radioactive isotopes (atoms that give off radiation) are also used to help diagnose and treat certain diseases. Radioisotope technicians generally prepare dilutions of radioactive material according to a prescribed formula, operate the several types of equipment used to perform the different tests and measurements, and make the necessary calculations. These technicians may also design or adapt apparatus and develop methods.

All medical X-ray technicians work under the direction of a medical doctor, usually a radiologist.

### Where Employed

Roughly one-fourth of the more than 60,000 X-ray technicians work in hospitals and over one-third of all registered technicians are employed in hospitals. The others work in medical and research laboratories, Federal agencies, State and local public health services, physicians' offices, dental clinics, school systems, business or industrial establishments which operate an employee-health program, and military establishments. Hospitals and research centers are most likely to employ persons skilled in both diagnostic and therapeutic techniques, whereas most other establishments usually employ only diagnostic technicians.

Most technicians work in large cities where medical facilities and services are largely concentrated. However, there are some jobs in rural areas where a hospital or other medical facility exists. In addition, the widespread use of X-ray for routine medical examinations in

various health and welfare and industrial preventive medicine programs has brought about expansion in the utilization of small mobile X-ray teams.

Most X-ray technicians are women, and about 70 percent of all registered technicians are women. The proportion of men who are registered has increased significantly during the past 15 years.

### **Training, Other Qualifications, and Advancement**

Training programs in X-ray technology approved by the Council of Medical Education and Hospitals of the American Medical Association are the most widely accepted courses of study. These programs are conducted by hospitals or by medical schools affiliated with hospitals.

In June 1960, there were 650 approved schools of X-ray technology located throughout the United States, nearly a 100-percent increase over 1953. Of these, about 85 percent offered a 24-month training program in 1960. Courses in most of the remaining schools were from 12 to 18 months in length. In a few schools, a 36-month curriculum was available, and one had a 48-month program. (Beginning July 1, 1962, approved courses must be a minimum of 24 months, with adequate vacation periods for each 12 months of training.)

All of the approved schools require that applicants be at least high school graduates, and a few schools require 1 or 2 years of college or a certificate from an approved nursing school. One school accepts only registered nurses. High school courses in mathematics, physics, chemistry, biology, and typing are considered desirable, but generally are not required. Preference is usually given to applicants between the ages of 18 and 30.

Aside from maintenance expenses, the cost of training in approved hospital schools is relatively low. Almost two-thirds of these schools charged no tuition in 1960, and most of the others charged less than \$200 for the complete program. Some charged the regular fees of the affiliated university. More than three-fourths of the schools paid their students a stipend.

A 24-month program in X-ray technology al-

most always includes the following courses: Anatomy and physiology, physics, radiation protection, darkroom chemistry, medical ethics, principles of radiographic exposure, film critique, radiographic positioning, department administration, and equipment maintenance.

Although most courses in X-ray technology prepare a student for a job with a wide range of duties, it is possible to acquire some degree of specialized training. All training programs now include courses in X-ray therapy. Some of the programs offer a course in radioisotopes for all students, but those who wish to specialize in this field are usually trained separately.

A few schools offer a bachelor of science degree in X-ray technology. With the exception of one school, however, the degree program is a recent development in the field. In some schools, students may take courses in X-ray technology along with their academic and scientific courses; in others, students may be required to complete their academic and scientific training in the first 2 years and then devote the remaining time to technical and practical experience in X-ray work.

Each year, the American Society of X-Ray Technicians conducts refresher courses to help technicians keep abreast of the field and to attain a higher degree of skill.

A technician with at least 2 years' experience (which may include training time), may apply for registration with The American Registry of X-Ray Technicians. An examination is held semiannually in various cities throughout the United States and the Registry issues certificates to all persons who pass. A technician may then use the title, "Registered Technician," and its abbreviation R.T. (ARXT). The certificate may be renewed each year. There were 27,000 registered technicians in 1960.

In addition to training programs in approved hospital schools, some vocational or technical schools offer courses in X-ray technology. Training also may be obtained while serving in one of the military services or through experience gained on the job under the supervision of a radiologist. Persons who acquire training in schools which have not been approved by the American Medical Association, or on the job, may have difficulty in qualifying for some X-

ray jobs, especially those with a wide range of assignments. Finding satisfying work commensurate with one's training depends in large measure upon the interest, application, and aptitude of the individual student, as well as on the requirements of individual employers.

An analysis of the results of examinations held by the Registry in 120 cities in May 1960 showed that a significantly higher percentage of persons with formal training passed than those with no formal training. In addition, grades were higher for students who had taken a 24-month program. Nearly 90 percent of the technicians who were trained under a 24-month program passed, compared with only 75 percent of those trained in a 12-month course.

In addition to the required training, an X-ray technician must be accurate, thorough, and precise. A knowledge of electrical and mechanical detail gained through training or experience is helpful. Since X-ray work is often performed on sick or helpless people, a technician should be sympathetic and patient and have a cheerful disposition and a keen sense of responsibility. The physically rigorous demands of continuous standing and lifting, often necessary in this work, call for persons with good health and stamina. People with a tendency toward anemia should avoid work with X-ray.

Authorities in the field believe that, in general, technicians with a variety of skills and experience have the best opportunities for promotion. Those employed in large X-ray departments usually have the chance to qualify for the job of chief X-ray technician or assistant to the chief. They also may be able to advance in their positions by qualifying to teach X-ray techniques to students in training. Since the number of such positions is fairly limited, however, versatility and ability to supervise or instruct others are very important for advancement.

### Employment Outlook

The demand for qualified X-ray technicians is expected to continue well into the 1960's. This demand will be due, in part, to the rising

need for technicians to staff rapidly expanding hospital and medical programs. The expansion of public health programs and services and growing interest in preventive medicine have increased the number of job opportunities in government employment. In addition, more technicians will be needed to help administer radiotherapy, which has become more widely used with new knowledge of the medical benefits of radioactive material.

During the past two decades, there has been a vast amount of basic medical research which is now being applied in the health field. Hospital facilities have been growing and significant technological advances have occurred in the diagnosis and treatment of diseases and injuries. The expanded use of X-ray equipment has accounted for a part of this advance. Originally confined to bone diagnosis and locating foreign bodies, X-ray is now used in such fields as tuberculosis detection, examination of teeth, and treatment of cancer and certain skin diseases. Routine X-raying of large groups is still being performed as part of a program for disease prevention and control by health departments, tuberculosis hospitals, industrial establishments, and health associations in many parts of the country. Many insurance companies now include a chest X-ray as part of the physical examination required for an insurance policy. All of these developments contribute to a growing need for medical X-ray technicians.

More than 90 percent of the 6,923 hospitals surveyed by the American Hospital Association in 1959 had diagnostic X-ray facilities. Almost half of them gave routine chest X-rays on admission and nearly one-third had an X-ray therapy department. Approximately one-fifth had facilities for radioisotope therapy. The continuation and expansion of these services will depend, in large part, on the availability of qualified technicians.

In addition to the demand for X-ray technicians to fill new positions created by expansion, annual replacement needs will be relatively high because of the large number of women in the field, many of whom can be expected to leave because of marital or family responsibilities. The American Society of X-Ray Technicians estimates that approximately 5,000 technicians



are needed each year to fill expansion and replacement needs. Because of the shortage of trained technicians who are available for full-time work, employers have in the past and are expecting in the future to hire part-time workers. Mature persons with recognized training or experience are generally acceptable to employers.

In 1959, nearly 2,300 persons graduated from approved courses in X-ray technology. This was an increase over the previous year, but, even so, the schools were only 86 percent filled.

### Earnings and Working Conditions

Salaries for X-ray technicians vary widely among geographic areas of the country and between urban and rural areas. Beginning technicians generally receive from \$3,000 to \$4,200 a year, according to authorities in the field. In 1960, the annual salary of a staff technician ranged between \$4,200 and \$5,400. Often a registered technician receives from \$25 to \$75 a month more than a nonregistered technician doing the same or similar type of work. Top salaries for chief technicians sometimes reach \$10,000 annually and may even exceed this level.

For persons entering Federal employment, salaries ranged in 1960 from \$4,040 to \$5,885 a year, depending on education and experience. The average salary for X-ray technicians in the Government was \$4,741 in 1959.

Average salaries (excluding premium pay and value of meals or other supplements) of X-ray technicians working full time in hospitals in 15 metropolitan areas in 1960 ranged from \$52.50 to \$91 a week for men and \$57 to \$88 for women. Corresponding earnings of chief

technicians averaged from \$91 to \$123 a week for men and from \$84 to \$111.50 for women.

Full-time technicians generally work 8 hours a day, 40 hours a week and may be "on call" for some night or emergency duty for which they receive equal time off or additional compensation. Most are covered by the same vacation and sick leave provisions as other workers in the organizations which employ them, and some receive free medical care and private pension benefits.

Medical X-ray technicians usually work in sanitary surroundings, and great care is exercised to protect them from radiation exposure. Potential hazards are kept in check partly by frequent blood counts and attention to diet, fresh air, and sunshine. Other precautions include the use of safety devices such as individual instruments that measure radiation, lead aprons, rubber gloves, and other shieldings. In the past few years, dangers have been greatly reduced or have been eliminated as a result of safety procedures followed by technicians and their employers.

### Where To Go for More Information

Detailed information about medical X-ray technicians is given in *The Outlook for Women as Medical X-Ray Technicians*, Women's Bureau Bulletin 203-8, 1954. Superintendent of Documents, Washington 25, D.C. Price 25 cents.

Information on approved schools and general information on the field may be obtained from:

The American Registry of X-Ray Technicians,  
2600 Wayzata Boulevard, Minneapolis 5, Minn.

The American Society of X-Ray Technicians,  
16 14th St., Fond du Lac, Wis.

## Medical Technologists\*

(D.O.T. 0-50.01)

### Nature of Work

Medical technologists are laboratory workers who perform a wide variety of chemical, microscopic, and bacteriological tests to aid physi-

cians in the detection, diagnosis, and treatment of disease. Medical technologists are usually responsible to a doctor of medicine, generally a pathologist (a physician who specializes in the nature and causes of disease). Some technologists, however, work under the

\* Prepared by the Women's Bureau, U.S. Department of Labor.



*Medical technologist analyzing lung gases to aid in the diagnosis of respiratory ailments.*

supervision of a medical scientist who specializes in a particular branch of clinical science. Other laboratory personnel, working as technicians, assistants, or aids, may perform some of the less complex and more routine tests to assist the medical scientist, technologist, or physician.

Among the numerous tests which medical technologists may make are blood counts, urinalyses, and biological skin tests. Other body fluid and tissue samples are also examined microscopically, cultured to determine the presence of micro-organisms such as bacteria or fungus, and analyzed for chemical content or reaction. Technologists may also type and cross-match blood samples, determine blood coagulation time and sedimentation rates, measure basal metabolism, and analyze water, food products, or other materials for bacteria.

As reliance on laboratory tests to reveal disease in its early stages becomes more general, the role of the medical technologist in providing accurate, lifesaving information grows increasingly important. For example, in cases of suspected cancer, medical technologists must sometimes prepare slides from sample tissues and body cells during an operation. Both speed and accuracy are required in such preparation. In all their work, technologists must be able to recognize unusual conditions and make correct

observations. They need both theoretical knowledge and scientific competence in the solution of difficult problems and analyses.

Medical technologists who work in small laboratories often perform many different types of tests. Those employed in large laboratories, on the other hand, usually specialize even though they are qualified to work in various fields of laboratory science. Specialized areas include bacteriology, parasitology, biochemistry, blood banking, hematology (blood analysis), histology (tissue preparation and examination), and the newer fields of virology and cytology (analysis of cast-off body cells for early evidence of cancer). Most medical technologists conduct tests or studies in connection with examinations and treatment of patients; some do research on new drugs or on the improvement of laboratory techniques; and some perform administrative duties as the technical head of a laboratory.

### Where Employed

About 30,000 medical technologists were registered in 1960 with the Registry of Medical Technologists of the American Society of Clinical Pathologists (ASCP) and have earned the right to use the professional designation "M.T. (ASCP)" after their name. Of this group, nearly 23,000 were employed, and between 80 and 90 percent were women. In recent years, an increasing number of men have been entering this comparatively new profession.

The Registry of the American Medical Technologists (AMT), which compared with ASCP has set fewer years of formal training as a requirement for registration, reported in 1960 that more than 10,000 medical laboratory workers had satisfied their registry requirements and were entitled to use the designation "M.T." The AMT estimated that over 80 percent of their group were men and about 95 percent were employed.

In 1959, hospitals employed 39,000 medical technologists and technicians, including 13,000 with the designation M.T. (ASCP), according to an American Hospital Association survey. The AMT reported that these hospital em-

ployees included 3,500 persons with the designation M.T.

The largest group of medical technologists work in hospital laboratories. Others are employed in private laboratories, public health facilities, government and private research institutions, and pharmaceutical companies; a few are self-employed. Most technologists work in large metropolitan areas where the largest facilities are located, but some will be found in less populated areas, wherever a hospital or laboratory exists.

### **Training, Other Qualifications, and Advancement**

In order to qualify as an M.T. (ASCP), a student must have completed 3 years of college plus 12 months in a school of medical technology approved by the Council on Medical Education and Hospitals of the American Medical Association (AMA), and pass an examination administered by the Registry of Medical Technologists of the ASCP. The 3-year college prerequisite for admission to AMA-approved schools, effective January 1962, replaces a 2-year prerequisite and includes the following course requirements: 4 semesters of chemistry, 2 semesters of which must be general college chemistry; 4 semesters of biological sciences, 2 semesters of which must be general biology or zoology; and 1 semester of mathematics.

At the end of 1960, about 750 schools of medical technology, all of which are in or affiliated with a hospital, were AMA-approved. Students at these schools receive 12 months of instruction in theory and laboratory work. Over 500 schools of medical technology have established joint programs with colleges and universities whereby a bachelor of science degree is granted upon completion of 3 years of college work and 1 year of clinical training. Several universities also offer advanced degrees in medical technology for those who plan to specialize or teach.

To meet the AMT's qualifications for an M.T., a person must be a high school graduate, complete a specified course in an AMT-approved school of medical technology or a college program which offers equivalent training, and pass a written examination. The specified

course in an AMT-approved school now consists of 12 months of concentrated study in medical technology and 6 months' internship in a medical laboratory, but will be expanded, effective September 1962, to 18 months of study plus 6 months' internship. Most of the classroom study and all of the laboratory work must include certain biological science and related courses.

The rising emphasis on academic training, including more science course requirements, is related to the increasing complexity of medical laboratory procedures, the advance in scientific knowledge, and the establishment of professional standards for medical technologists. As a result, the trend at the present time is toward a 4-year training program. Many employers prefer or require that prospective staff members be registered, or eligible for registration, with the ASCP. Still other hospitals and clinics are accepting only those with a college degree.

In the Federal service, applicants for entry positions as medical technologists must have completed successfully either a 4-year course in medical technology leading to a bachelor's degree or 3 years of college (with certain courses) plus a combination of approved training and experience. Those with a bachelor of science degree in either chemistry or one of the biological sciences must also have 1 year of training and/or experience in medical technology. To be eligible for advancement, additional professional education and/or experience is required as a medical technologist or medical specialist.

Care should be taken in the selection of a training school, as there is much variation in the quality and type of training offered. Persons with the most and best training will find a greater number of positions requiring broad training and experience open to them, especially positions leading to advancement.

Four States (Alabama, California, Florida, and Hawaii) require licenses for medical technologists and other laboratory personnel. Since the laws differ among these States, students should obtain licensing information at the time they plan their program of training in medical technology.

The cost of training, aside from maintenance

expenses, is usually low. About six out of seven AMA-approved schools of medical technology charge no tuition, and about four out of seven grant stipends. College students preparing for a career in medical technology are eligible to participate in the National Defense Education Act program under which they can apply for loans in amounts up to \$1,000 a year, for 5 years of education. Several State societies of medical technology and other local organizations offer college scholarships to students planning to enter this profession. Various arrangements are available for those who wish to combine work and study. Some employers have set up plans whereby students are offered scholarship aid in return for current services or agreement on future employment.

Advancement for medical technologists may be to supervisory, research, or teaching positions. More frequently, through additional college training, they may advance to higher levels in one of the specialties. For example, for work in the field of cancer detection, the RSCP offers Certification in Exfoliative Cytology to those who have completed 2 years of college work plus 6 months of specialized study and 6 months of experience in accordance with specified requirements.

A Certificate in Blood Banking is awarded by ASCP to those who have completed the requirements for an M.T. (ASCP) plus an additional year of training and experience in blood banking. Similarly, the ASCP awards a Certificate in Chemistry or in Microbiology to those with a bachelor's degree and a major in chemistry or bacteriology plus 1 year of medical laboratory experience in their respective field; and Specialist Certification to those with a master's or doctor's degree plus 3 years of experience in an acceptable medical laboratory.

The Registry of the AMT offers specialty certification to an M.T. who has satisfied the 4-year requirements for a bachelor's degree in the respective specialty or has 60 college credits and 4 years' experience in the specialty. The specialties include clinical bacteriology, clinical biochemistry, clinical cytology, clinical hematology, clinical parasitology, blood banking, and serology.

Important personal traits needed by those

interested in medical laboratory work are extreme accuracy, patience, dependability, and resourcefulness, as well as the ability to work under pressure. Since correct results depend upon manual and visual accuracy, deftness and good eyesight are essential. Technologists should also have an interest in science and a desire to serve the sick.

### Employment Outlook

Employment opportunities for qualified medical technologists are expected to remain excellent throughout the 1960's. As advances in medical knowledge and practice depend more and more on laboratory work and as additional hospital and medical facilities are constructed, there is greater need for more technologists.

Particularly strong demand is anticipated in biochemistry, bacteriology, immunology, and virology. The increasing complexity of laboratory procedures in these fields and the continual development of new drugs and new techniques point up the necessity for well-qualified personnel with college training. Newly developed automatic analyzers will be able to make some types of tests but are not expected to affect materially the demand for skilled medical technologists. Much medical laboratory work will continue to be carried on in hospital laboratories, although testing in laboratories outside hospitals has been stimulated by the growing membership in health insurance plans.

Replacement needs will account for additional job openings, since many of the workers in this field are young women who may be leaving their jobs for marriage and family responsibilities. Good employment opportunities exist for mature persons who are adequately trained or experienced and for persons interested in part-time work. Women returning to this field after several years' absence, however, may find refresher courses necessary.

Over the long run, the factors responsible for the increased demand for medical technologists in recent years are expected to continue to be influential in the future. With the expanding need for medical laboratory services, the current shortages will probably continue, despite the fact that a nationwide campaign to recruit

young people into the profession has been meeting with considerable success.

### Earnings and Working Conditions

Average weekly salaries of women medical technologists employed by private and nonfederal Government hospitals in 15 cities in 1960 ranged from \$69 a week in Philadelphia to \$109 a week in Los Angeles–Long Beach. (Those covered performed “duties normally requiring 12 months’ training in an approved school for medical technologists following at least 2 years of college.”) The range of average weekly salaries for men medical technologists was from \$69.50 in Philadelphia to \$110 in San Francisco–Oakland. In general, higher salaries were paid by the government hospitals than by private hospitals in the same cities.

Salaries of persons classified as “medical technologists” employed by the Federal Government started at \$4,345 in 1961. Those with more experience and responsibility could earn up to \$10,255 a year. According to a 1959 survey, the average salary was \$5,561. Federal employees classified as medical technicians (who are not required to have the training in type, scope, and thoroughness equivalent to that represented by completion of full professional training in medical technology) had a starting salary of \$3,185 in 1961 and an average salary of \$4,769 in 1959.

The average workweek of medical technologists is 40 hours, but there are many opportunities for part-time and night work. Technologists generally are provided vacations and sick leave benefits, and almost all are covered by private retirement plans or Federal social security. The medical laboratories where they work are usually well-lighted, clean, and pleasant, although unpleasant odors, diseased tissue, and blood are often present. Few hazards exist, however, in laboratories using proper methods of sterilization and requiring extreme care in the handling of specimens, materials, and equipment.

### Where To Go for More Information

Information about employment opportunities and schools of medical technology approved by the American Medical Association may be obtained from:

Registry of Medical Technologists of the American Society of Clinical Pathologists,  
P.O. Box 44, Muncie, Ind.

American Society of Medical Technologists,  
Suite 25, Hermann Professional Bldg., Houston 25,  
Tex.

Information about employment opportunities and other schools offering training in medical technology may be obtained from:

American Medical Technologists,  
Suite 5A, Bass Bldg., Enid, Okla.

## Chiropractors

(D.O.T. 0–39.90)

### Nature of Work

Chiropractic is a system of treatment based on the belief that the nerve system largely determines the state of health of the human body and that any interference with this system impairs normal functions and lowers the body’s resistance to disease. Chiropractors treat their patients primarily by specific adjustment of parts of the body, especially the spinal column. Many also use such supplementary measures as diet, exercise, rest, and water, light, and heat therapy. Because of the emphasis placed on the importance of the spine and its position,

most chiropractors use X-ray extensively in their practice to aid in locating the source of patients’ difficulties. Chiropractic as a system of healing does not include the use of drugs or surgery.

### Where Employed

About 25,000 chiropractors were employed in the United States in 1960. The greatest numbers were engaged in independent private practice. Some were employed by athletic organizations and industrial firms; others taught or did research work at chiropractic

schools, worked on the staffs of chiropractic clinics, or were employed as salaried assistants to established practitioners. About 40 percent of all chiropractors were located in California, New York, Texas, and Ohio.

### **Training and Other Qualifications**

Most States and the District of Columbia regulate the practice of chiropractic and grant licenses to chiropractors who meet certain educational requirements and pass a State board examination. The type of practice permitted and the educational requirements for licensure vary considerably from one State to another. As of 1960, four States—Louisiana, Massachusetts, Mississippi, and New York—did not regulate the practice of chiropractic nor issue licenses to chiropractors.

Most States require 4 years of training in a chiropractic school following high school graduation. Over one-third of the States also require 1 or 2 years of preparatory college work before chiropractic training. In a few States, considerably less than 4 years of chiropractic education is sufficient to qualify for a license. About half the States also require that chiropractors pass a basic science examination in order to qualify for a license. Chiropractors licensed in one State may generally obtain a license to practice in another State without further examination.

Approximately two-thirds of the 16 chiropractic schools in the United States in 1960 restricted their teaching to manipulation and spinal adjustments. The others offered a broader curriculum including training in such subjects as chiropractic physiotherapy and clinical nutrition. In most chiropractic schools, the first 2 years of the 4-year curriculum are devoted chiefly to classroom and laboratory work in subjects such as anatomy, physiology, and biochemistry. The last 2 years are spent in obtaining practical experience in the schools' clinics. The degree of doctor of chiropractic (D.C.) is awarded by all schools to students completing chiropractic training.

Most newly licensed chiropractors open their own offices or purchase an established practice. Some start as assistants to other chiropractors

in order to acquire experience and funds. A considerable financial investment is usually necessary to open and equip an office. Among the personal qualities considered desirable for a practitioner is the ability to deal with people sympathetically. The work does not call for unusual strength or endurance, but does require considerable dexterity with the hands.

### **Employment Outlook**

The success of the new practitioner will depend in large part on proper selection of a location for practice. Opportunities for beginning chiropractors will continue to be best in those parts of the country where chiropractic is most fully accepted as a method of treatment. Small towns or suburban areas, where the young practitioner can become known more quickly than in a big city, offer the best prospects for developing a practice.

The wide variation in community acceptance and in the provisions of State laws is reflected in the concentration of chiropractors in certain areas. The ratio of chiropractors to population is highest in the Western States.

Employment opportunities are expected to be greatest for new entrants who are able to meet the highest State licensing requirements, including graduation from a 4-year course of 4,000 or more hours. In view of the trend in many States toward raising the educational requirements for chiropractic practice, thorough training will become increasingly important.

Women are expected to continue to find good opportunities in this field, since some women and children prefer to go to women chiropractors for treatment. About 15 percent of the chiropractors in practice in 1960 were women, and all chiropractic schools accept women as students.

### **Earnings and Working Conditions**

In chiropractic, as in other types of independent practice, earnings are relatively low at the beginning but rise after the first few years. Though incomes of chiropractors vary widely, their average income above expenses

was over \$10,000 a year in 1959, according to the limited data available.

### Where To Go for More Information

Information on State licensing requirements may be obtained by writing to the State board

of licensing in the capital of the State in which the individual plans to practice.

General information on chiropractic as a career may be obtained from:

National Chiropractic Association,  
National Bldg., Webster City, Iowa  
International Chiropractors Association,  
741 Brady St., Davenport, Iowa

## Dental Laboratory Technicians

(D.O.T. 0-50.06)

### Nature of Work

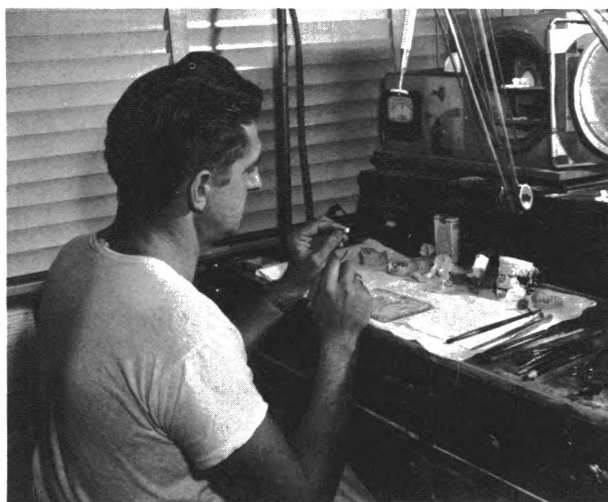
Making artificial dentures—teeth, crowns, bridges, or other dental appliances—is highly skilled work, which used to be done chiefly by dentists. Now dental laboratory technicians do much of this work. These technicians do not deal directly with patients but receive prescriptions from dentists, which are often accompanied by impressions of patients' mouths. Since no two patients have exactly the same dental problems, technicians have to do varied work in carrying out dentists' prescriptions. A first step in making many kinds of appliances is forming models in hard plaster (dental stone) from the impressions taken by dentists. In addition, technicians may, for example, make metal castings for dentures; polish and finish dentures; construct metal or porcelain crowns or inlays for partially destroyed teeth; make gold and other metal bridges; and make appliances to correct such difficulties as cleft palates. In performing this work, dental laboratory technicians use small handtools, electric lathes and drills, high-heat furnaces, and other kinds of specialized laboratory equipment.

Some dental laboratory technicians are "generalists" who do all types of dental laboratory work. Others specialize in such areas as making crowns and bridges, arranging artificial teeth on dental appliances so that they function properly and look natural, processing plastic materials, working with ceramics (porcelain), or making castings of gold or other metal alloys used in dentistry. The level of the work done by technicians ranges from semi-skilled to highly skilled, depending upon the qualifications of the individual technician and

the requirements of the job. Technicians with limited training and experience ordinarily perform relatively simple jobs—for example, mixing and pouring plaster into casts and molds. Well-qualified dental laboratory technicians are assigned to the more difficult laboratory processes and may work with expensive metals.

### Where Employed

About 25,000 dental laboratory technicians were employed in mid-1959. Most of them worked in commercial laboratories, either as employees or as owners of the business. Commercial laboratories, which handle orders from any dentist, are typically small businesses; more than one-fourth of all laboratories were 1-man shops and less than 15 percent had 10



*Dental laboratory technician making an exact likeness of a tooth.*

or more workers in 1959. Between 2,000 and 3,000 laboratory technicians worked for individual dentists in their offices. Most of the remainder—about 650—were employed by the Federal Government, chiefly in the Veterans Administration and in the Department of the Army. Women, who account for about 10 percent of all dental laboratory technicians, worked mainly in large commercial laboratories.

Dental laboratory technicians, like the dentists who use their services, are located mainly in big cities and in the States with the largest populations. In 1959, more than half of all dental laboratory technicians were in cities of more than 50,000 population. Moreover, they were concentrated in California, Illinois, New York, and Pennsylvania.

### **Training, Other Qualifications, and Advancement**

The most common way of entering this occupation is to secure a trainee position and learn the craft on the job—usually in a commercial laboratory or in a Veterans Administration or other hospital offering dental services. Typically, an on-the-job training program lasts 3 or 4 years, depending on such factors as the student's previous experience and training, his ability to master the techniques, and the number of specialized areas to be learned. Courses in dental laboratory work are offered in some public vocational high schools and junior colleges. In addition, a few private schools offer 1- to 2-year courses in dental laboratory technology. Regardless of the student's educational background, actual work experience is always necessary to qualify as a full-fledged technician.

Recently, the National Association of Dental Laboratories and the American Dental Association have jointly sponsored a certification program for dental laboratory technicians who can meet certain training and other requirements established by the associations. By the fall of 1960, four schools had been accredited by the American Dental Association to provide high school graduates (or those with equivalent education) with the 2 years of training required under the program. The first year of training consists of formal classroom in-

struction in medical law and ethics, chemistry, ceramics, metallurgy, and other related subjects. During the second year, the student must complete 12 months of supervised practical experience in an approved school or dental laboratory. He may receive some pay for work performed during this period. After completion of the 2-year training program, 3 years of experience in a dental office or a commercial laboratory are required before the dental laboratory technician is eligible to take the examination for certification in one or more of five areas—generalist, full denture fabrication, partial denture fabrication, ceramic technique, and crown and bridge fabrication.

Among the personal qualifications which employers look for in selecting trainees are a high degree of manual dexterity, good color perception, patience, and a liking for detailed work. Preference may also be given young people who have completed high school courses in art, ceramics and pottery, sculpturing, blueprint reading, plastics, metalworking, and physiology. A year or two of experience as either a clerk or an assistant in a dentist's office is also helpful preparation for prospective dental laboratory technicians.

### **Employment Outlook**

Job opportunities are expected to be good through the mid-1960's for well-qualified, all-around craftsmen and for specialists in ceramics, gold, and other metalwork. Some job opportunities will also arise each year for trainees. As in the recent past, the demand for dental laboratory technicians will probably stem largely from the need to replace technicians who transfer to other fields of work, retire, or die. Most opportunities for salaried employment, for both experienced and inexperienced dental laboratory technicians, will be with large commercial laboratories and in the Federal Government. Some experienced technicians will find favorable opportunities for establishing their own laboratories. A technician whose work has become known to several dentists in a community will have the best prospect of building a successful business.

A moderate increase in employment of dental



laboratory technicians is anticipated over the long run. The anticipated growth in population, rising income, the growing public awareness of the importance of preventive dentistry, the mounting number of people in the older age groups and, with it, the number of people requiring artificial dentures, all point toward the need for more dental laboratory technicians. Moreover, the number of dentists is not expected to keep pace with population growth, and it is likely that dentists will send more and more of their laboratory work to commercial firms, to free themselves increasingly for "chair-side" practice, research, and other professional activities.

In the long run, certification may become important for obtaining employment as a dental laboratory technician, since many employers are likely to regard the certificate as the best readily available evidence of the individual's competence for work in this field.

### **Earnings and Working Conditions**

Inexperienced dental laboratory technicians employed in commercial laboratories typically earned between \$40 and \$60 a week, according to a 1958 survey by the American Dental Association. Experienced technicians in commercial laboratories generally earned between \$80 and \$125 a week, depending on their skill level and experience. Technicians who work with ceramics or gold and other metals received the highest salaries. In general, earnings of self-employed technicians are higher than those of salaried workers.

Trainees employed in the Federal Govern-

ment started at about \$75 a week in mid-1960. The majority of experienced dental laboratory technicians employed in the Federal Government earned about \$100 a week.

Salaried technicians usually work the standard 40-hour week, but self-employed technicians frequently work longer hours. Many technicians in commercial laboratories receive paid holidays and vacations, and some are also provided paid sick leave, bonuses, and other fringe benefits. Technicians employed by the Federal Government come under the same leave and retirement provisions and have the same benefits as other Government workers.

The work of dental laboratory technicians is not strenuous and most jobs can be done by handicapped workers provided they have use of their hands and fingers.

### **Where To Go for More Information**

Information about the training and other requirements for certification, as well as a list of approved schools, is available from:

American Dental Association, Council on Dental Education,  
222 East Superior St., Chicago 11, Ill.

Information on career opportunities in commercial laboratories may be obtained from:

National Association of Dental Laboratories,  
201 Mills Bldg., Washington 6, D.C.

Information on entrance requirements for trainees in dental laboratories in veterans' hospitals may be obtained from:

Veterans Administration, Department of Medicine and Surgery, Washington 25, D.C.

## **Optometrists**

(D.O.T. 0-39.92)

### **Nature of Work**

Optometrists examine eyes and perform other services to safeguard and improve vision. They use special instruments and tests to find and measure defects in vision and, when needed, prescribe eyeglasses, contact lenses (invisible lenses), and eye exercises or other treatment that does not require drugs or surgery. Most

optometrists supply their patients with the eyeglasses prescribed, though some do only minor repair work, such as straightening frames or replacing nose pieces on glasses. A few optometrists specialize in work such as fitting persons who are nearly blind with telescopic spectacles, studying the relationship of vision to highway safety, and analyzing lighting and other condi-



*Optometrist examining patient's eyes.*

tions that affect the efficiency of workers in industry or business. A few optometrists are engaged primarily in teaching, research, or a combination of the two.

Optometrists should not be confused with ophthalmologists, oculists, or dispensing opticians. Ophthalmologists and oculists are licensed physicians who specialize in the medical and surgical care of the eyes and may prescribe drugs or other treatment, as well as lenses. Dispensing opticians (see index) fit and adjust eyeglasses according to prescriptions written by ophthalmologists or optometrists; they do not examine eyes or prescribe treatment.

#### **Where Employed**

Most of the 17,000 optometrists employed in early 1960 were in private practice in their own offices. However, some were salaried employees, working as assistants to established practitioners or for health clinics, hospitals, optical instrument manufacturers, or government agencies. A few taught in colleges of optometry or served as optometrists in the Armed Forces.

Optometrists are located chiefly in large cities and industrial areas, where many people

are engaged in office work or other occupations which tend to create or emphasize vision problems. Nearly 40 percent are in four States—Illinois, California, New York, and Pennsylvania. Many small towns and rural areas, especially in the South, have no optometrists.

#### **Training, Other Qualifications, and Advancement**

To practice optometry in any State or the District of Columbia, one must have a license. Applicants for licenses must be graduates of an accredited school of optometry and pass a State Board examination. In some States, only graduates of certain schools of optometry are admitted to these examinations. A student planning to become an optometrist should, therefore, choose a school approved by the Board of Optometry in the State where he expects to practice. Altogether, there were 10 schools of optometry in the country in 1960. Applicants with the necessary qualifications have an excellent chance of being admitted to one of these schools.

At least 5 years of study beyond high school are needed to become an optometrist. The most usual requirement is 2 years of preoptometry education in an approved college, followed by 3 years of training in an optometry school. However, some optometry schools require completion of a 4-year course after the 2 years of preoptometry study which are a prerequisite for admission. Preoptometry courses include mathematics, physics, biology, and chemistry, as well as English and other liberal arts courses. Students in schools of optometry have both classroom and laboratory work, as well as an opportunity to gain professional experience in the clinic run by the school. Most schools award the degree of Doctor of Optometry (O.D.), but some confer bachelor's degrees in science or optometry instead. Optometrists who wish to specialize often take additional training. A master's or Ph. D. degree in physiological optics or in a related field is usually required for teaching and research work.

A prospective optometrist should have a liking for mathematical and scientific work, the ability to use delicate precision instruments, mechanical aptitude, and good vision. In addi-

tion, to become a successful practitioner, he must be able to deal with people tactfully.

The majority of optometrists start either by setting up a new practice or by purchasing an established one. Some begin as assistants to established practitioners, and young graduates are frequently advised to do this in order to acquire experience and the funds necessary to equip an office. A good office location is of major importance for a successful practice. The optometrist should consider the number of optometrists and medical eye specialists in the vicinity, in relation to size, occupations, age, and income level of the population in the area.

### **Employment Outlook**

Employment opportunities for new optometry graduates are expected to remain favorable through the mid-1960's. During this period, the number of new graduates is likely to be considerably less than the number of experienced optometrists who retire or stop practicing for other reasons. As in the past, opportunities to set up a new practice will generally be best in small towns and in residential areas of cities, where the new optometrist can easily become known and where competition is not as keen as in large business centers. Communities, especially in the South, that have no optometric services available will also offer opportunities for new graduates.

Over the long run, the demand for eye-care services will continue to grow. The importance of good vision to efficiency at work and in school is becoming more widely recognized; eye strain has been increased by many aspects of modern living; and the use of eyeglasses has come to be generally accepted. The volume of eye-care services needed will also be increased by the anticipated growth in population, especially by the expected sharp rise in the number of older people—the group most likely to need glasses. Although the expanded demand will be met in part by medical doctors who are eye specialists, optometrists will continue to supply

a substantial proportion of all eye-care services.

Women optometrists, who constitute about 5 percent of the profession, have many opportunities to work as salaried assistants in the field of visual training. Those in private practice have been particularly successful in work with children.

### **Earnings and Working Conditions**

In optometry, as in some of the other health fields, a low income must be expected during the first few years of practice. As a practice becomes established, earnings usually rise significantly. In 1958, the average income above expenses for self-employed optometrists was \$9,970, according to the American Optometric Association.

Optometrists practicing in towns and small cities have higher average earnings than those in large cities. However, there are some successful practitioners in big cities who have very high incomes. Although optometrists in salaried positions may at first earn more than those who go into practice for themselves, the situation is likely to be reversed after a few years of experience.

Working hours in this profession are usually regular. Since the work is not strenuous, optometrists can often continue to practice after the normal retirement age.

### **Where To Go for More Information**

Additional information on optometry as a career is available from:

American Optometric Association, Inc.,  
4030 Chouteau Ave., St. Louis 10, Mo.

Information on required preoptometry courses may be obtained by writing to the optometry school in which the prospective student wishes to enroll. The Board of Optometry in the capital of the State in which the student plans to practice will provide a list of optometry schools approved by that State.

## Veterinarians

(D.O.T. 0-34.10)

### Nature of Work

Veterinarians (doctors of veterinary medicine) treat sick and injured animals. They also give advice regarding the care and breeding of animals and help to prevent the outbreak and spread of diseases among them, by physical examinations, tests, and vaccinations. Because many animal diseases can be transmitted to people, this work is important to the public health.

About half of all veterinarians are general practitioners who take care of both large and small animals. Of those who are specialists, the greatest number are in "pet practice," often operating hospitals with boarding facilities for dogs and cats. Some veterinarians specialize in the treatment of certain kinds of animals, such as prize livestock, poultry, or thoroughbred horses. Many veterinarians inspect meat, poultry, and other foods as a part of the public health programs of the Federal Government and many State Governments. A small number teach in colleges or do public health or other research related to animal diseases, drugs, and foods.

Since animals cannot describe how they feel, veterinarians must diagnose diseases and injuries on the basis of appearance and behavior, and by taking temperatures and making tests. When needed, veterinarians operate on animals and prescribe and administer drugs, medicines, biologicals, serums, and vaccines. They use X-ray machines, hypodermic needles, syringes, and other medical equipment especially adapted for use with animals. They may treat animals on the farm—sometimes in open fields—or in veterinary clinics or hospitals.

### Where Employed

About 19,000 veterinarians—fewer than 5 percent of whom were women—were at work in the United States in 1960. Of these, more than two-thirds were in private practice. The second largest number worked for the Federal Government—chiefly in the U.S. Department



Courtesy of U.S. Air Force

*Veterinarian checking the physical condition of animals used in space probes.*

of Agriculture, which employed nearly 2,000 veterinarians full time and over 5,000 part time; a few worked for the U.S. Public Health Service. More than 700 were commissioned officers in the Veterinary Corps of the Army and the Air Force. In addition, a substantial number worked for State and local government agencies and a few worked for international health agencies. Some were also employed by schools of veterinary medicine, State agricultural colleges, animal food companies, and pharmaceutical companies that manufacture drugs for animals.

Veterinarians practice in all parts of the country, although they are located chiefly in States where many cattle and other livestock are raised. In 1960, one-third of all the veterinarians in the United States were in five States—California, with about 1,500; and New York, Illinois, Iowa, and Ohio, each with over 1,000. Veterinarians in rural areas chiefly treat large animals; those in small towns usually engage in general practice; those in cities and suburban areas frequently limit their practice to pets.

### **Training, Other Qualifications, and Advancement**

To practice veterinary medicine in any State or the District of Columbia, one must have a license. An applicant for a license is generally required to be a graduate of an approved veterinary school and to pass a State Board examination. A few States also require some practical experience under the supervision of a licensed veterinarian. A limited number issue licenses without examination to veterinarians who have passed an examination in another State.

For positions in public health or other research or college teaching, the master's or Ph.D. degree in a field such as pathology, public health, or bacteriology may be required, in addition to the degree of Doctor of Veterinary Medicine (D.V.M.), awarded upon graduation from veterinary school.

Two years of preveterinary college work followed by 4 years of professional study in a school of veterinary medicine are the minimum requirements for the D.V.M. It may take 3 years, however, to complete the preveterinary curriculum, which emphasizes chemistry and other science courses. The veterinary school training includes considerable practical experience in treatment of animals, as well as laboratory work in anatomy, biochemistry, and other scientific and medical fields.

There were 18 colleges of veterinary medicine in the United States in 1960. Each year many more young people apply for admission than can be accepted. Some of the qualifications considered in selecting students are: a good scholastic record, amount and character of preveterinary training (in 1958, about one-fourth of the students selected had a bachelor's degree), a farm background, good health, and a liking for animals. Opportunities for women students are limited; most veterinary colleges are reluctant to admit them. Since veterinary colleges are largely State supported, residents of the State in which the school is located are almost always given preference. In the South and West, regional educational plans have been developed that permit cooperating States without veterinary schools to send a few students to designated regional schools. In other areas, schools may informally decide to accept a cer-

tain number of students from other States, often giving priority to applicants from nearby States without veterinary schools.

Some veterinarians begin as assistants to, or partners of, established practitioners. Many establish their own practice and start with a modest financial investment in such essentials as drugs, instruments, and a car. To open an animal hospital or purchase an established practice requires a substantial investment. Newly qualified veterinarians who enter the Army or Air Force are commissioned as first lieutenants. New graduates of accredited veterinary schools can also qualify for Federal civil service positions as meat and poultry inspectors, disease-control workers, and research assistants. In addition, the U.S. Department of Agriculture offers juniors in schools of veterinary medicine opportunities to serve as trainees during the summer months.

### **Employment Outlook**

Graduates of schools of veterinary medicine will probably continue to have good employment opportunities throughout the 1960's. The supply of graduates is not expected to meet the total demand for veterinarians in private practice, government service, and colleges and universities. Many of the opportunities to enter private practice or salaried employment will arise from the need to replace veterinarians lost to the profession through retirement or death. Because many veterinarians are in the older age groups, it is anticipated that these replacement needs will continue to absorb almost half of the nearly 900 veterinarians who will graduate each year from existing schools.

A gradual expansion in employment of veterinarians can be expected in the long run. More veterinarians will be needed to care for the increased number of animals required to feed the country's expanding population. The trend toward suburban living is expected to bring about a large growth in the pet population and thus create a greater demand for pet animal specialists. Emphasis on scientific methods of raising and breeding livestock and poultry will continue to increase, and public health and disease-control programs are ex-

pected to grow. More teachers will be needed to meet the anticipated rise in agricultural college enrollment, and veterinary research will expand further. In addition, the developing programs in international public health and atomic energy research will offer some opportunities.

The need for replacements and the anticipated growth in demand for veterinary services, when related to the limited number of veterinarians who can be trained each year by existing schools, point toward continued favorable opportunities for veterinarians in the long run. However, the demand for veterinary service is closely related to economic conditions. Since the market value of a farm animal largely determines how much its owner can afford to spend on its care, any major economic recession would greatly affect incomes and employment opportunities in large-animal practice.

### **Earnings and Working Conditions**

Newly graduated veterinarians had a starting salary of \$6,435 a year in full-time positions with the Federal Government in 1960. Summer trainees in the U.S. Department of Agriculture were paid \$103 per week actually employed (representing a rate of \$5,355 per year). Veterinarians commissioned as first lieutenants in the Army and Air Force received pay and allowances totaling approximately \$6,000 per year.

Beginning veterinarians employed in animal hospitals received monthly salaries averaging about \$500, according to an estimate by the American Veterinary Medical Association. In

addition, salaried veterinarians may be furnished with lodgings and may also share in the income of the animal hospital.

Veterinarians beginning their own practice can generally cover their expenses the first year and may often add to their earnings by working part time for government agencies. As they gain experience, their incomes increase substantially. In general, income from private practice also depends upon location and type of practice. Very successful practitioners may earn \$20,000 or more a year.

Veterinarians are sometimes exposed to danger of physical injury, disease, and infection. Those in private practice are likely to have long and irregular working hours; those in rural areas may have to spend much time traveling to and from distant farms. Veterinarians can continue working well beyond the normal retirement age because of the many opportunities for part-time employment or practice.

### **Where To Go for More Information**

Additional information on the earnings of veterinarians and on veterinary medicine as a career, as well as a list of schools providing training, may be obtained from:

American Veterinary Medical Association,  
600 South Michigan Ave., Chicago 5, Ill.

Information on opportunities for veterinarians in the U.S. Department of Agriculture is available from:

Agricultural Research Service, U.S. Department  
of Agriculture, Washington 25, D.C.

## **Osteopathic Physicians**

(D.O.T. 0-39.96)

### **Nature of Work**

Osteopathic physicians emphasize manual manipulation in treating patients, and also use surgery, drugs, and all other accepted methods of medical care. Most are "family doctors" who engage in general practice. These physicians usually see patients in their offices, make house calls, and treat patients in osteopathic

and some city and county hospitals. A few doctors of osteopathy are engaged primarily in research, teaching, or writing and editing scientific books and journals. A growing number specialize in 1 of the following 12 fields for which approved specialty examining boards have been set up: Internal medicine, neurology and psychiatry, ophthalmology and otorhino-

laryngology, pediatrics, anesthesiology, physical medicine and rehabilitation, dermatology, obstetrics and gynecology, pathology, proctology, radiology, and surgery.

### Where Employed

Nearly all of the 13,500 osteopathic physicians professionally active in the United States in 1960 were in private practice. Less than 5 percent held full-time salaried positions, mainly in osteopathic hospitals and colleges. A few osteopathic physicians were employed by private industry or government agencies.

Osteopathic physicians are located chiefly in those States which have osteopathic hospital facilities. In 1960, over half of all osteopathic physicians were in the following five States: California, with more than 2,000; Michigan, Pennsylvania, and Missouri, each with more than 1,000; and Ohio, with more than 800. Twenty-one States and the District of Columbia each had fewer than 50 osteopathic physicians. Over half of all general practitioners are located in towns and cities with under 25,000 population; the specialists, however, mainly practice in big cities.

### Training and Other Qualifications

A license to practice as an osteopathic physician is required in all States. As of 1960, licensed osteopathic physicians were qualified to engage in all types of medical and surgical practice in three-fourths of the States and the District of Columbia. The remaining States, however, limit in varying degrees the use of drugs or the type of surgery that may be performed.

To obtain a license, a candidate must be a graduate of an approved school of osteopathy and pass a State board examination. In 21 States and the District of Columbia, the candidate must pass an examination in the basic sciences before he is eligible to take the professional examination; some States also require a period of internship after graduation from osteopathic school. All States except Florida and Rhode Island will usually grant licenses, without further examination, to properly quali-

fied osteopathic physicians already licensed by another State.

Three years of preosteopathic college work followed by 4 years of professional study in an osteopathic college are the minimum requirements for the degree of doctor of osteopathy (D.O.). Preosteopathic education must include a specified number of credits in chemistry, physics, biology, and English. During the first 2 years of professional training, emphasis is placed on basic sciences such as anatomy, physiology, and pathology and on the principles of osteopathy; the last 2 years are largely devoted to work with patients in hospitals and clinics.

After graduation, almost all doctors of osteopathy serve a 12-month internship at 1 of the 94 osteopathic hospitals which the American Osteopathic Association has approved for intern training. Those who wish to become specialists must have at least 3 years of additional training followed by 2 years of supervised practice in the specialty.

Every year, more young people apply for admission to the six approved schools of osteopathy than can be accepted. In selecting students, consideration is given to grades received in preprofessional education, scores on medical aptitude tests, and the amount of preosteopathic college work completed (in 1960, about 70 percent of the students had bachelor's degrees). Also of great importance is the desire to serve as an osteopathic physician rather than as a doctor trained in other schools of medicine. Considerable weight is also given to a favorable recommendation by an osteopathic physician familiar with the applicant's background.

Newly qualified doctors of osteopathy usually establish their own practice. A few work as assistants to experienced physicians or become associated with osteopathic hospitals. In view of the variation in State laws regulating the practice of osteopathy, the osteopathic physician should carefully study the professional and legal requirements of the State in which he plans to practice. The availability of osteopathic hospitals and clinical facilities should also be taken into account when choosing a location.

### Employment Outlook

Opportunities for osteopathic physicians will remain excellent through the mid-1960's in those parts of the country where osteopathy is a commonly accepted form of medical care. Greatest demand will probably continue to be in California, Pennsylvania, and a number of midwestern States; further growth in employment opportunities is also anticipated in the Southwest and Northwest. Prospects for beginning a successful practice are likely to be best in rural areas, small towns, and city suburbs, where the young doctor of osteopathy can become known more easily than in the centers of large cities.

In the long run, opportunities for osteopathic physicians will probably continue to be good. There is likelihood of greater public acceptance of osteopathy, liberalization of certain State licensing laws, and the establishment of additional osteopathic hospitals. In addition, the demand for all kinds of medical care—including the services of osteopathic physicians—will continue to grow as a result of the increase in population, government provisions of medical services for veterans and members of the Armed Forces, the development of prepayment plans for medical care and hospitalization, and the underlying trend toward higher standards of health care. At the same time, growth in the number of osteopathic physicians in the country will be slow, unless training facilities are expanded. Approximately 430 doctors of osteopathy were graduated in 1960, but many of these are needed to replace those lost to the profession through retirement or death.

Women osteopathic physicians will find good

opportunities not only in private practice but also on faculties of osteopathic colleges and on the staffs of hospitals and clinics. Approximately 7 percent of all osteopathic physicians are women. Women students, however, represented only about 2 percent of the total enrollment in osteopathic colleges in 1960, although men and women are equally eligible for admission.

### Earnings and Working Conditions

In osteopathy, as in many of the other health professions, incomes usually rise markedly after the first years of practice. Earnings of individual practitioners are determined mainly by such factors as ability, experience, the income level of the community served, and geographic location. According to a survey made by the American Osteopathic Association in 1960, the average income above business expenses of general practitioners was \$15,400 a year, and for specialists \$23,100 a year.

Many osteopathic physicians work more than 50 and 60 hours a week. Those in general practice work longer and more irregular hours than specialists.

### Where To Go for More Information

Persons wishing to practice in a given State should find out about the requirements for licensure directly from the board of examiners of that State. A list of State boards, as well as general information on osteopathy as a career, may be obtained from:

American Osteopathic Association,  
212 East Ohio St., Chicago 11, Ill.

## Occupational Therapists \*

(D.O.T. 0-32.04)

### Nature of Work

An occupational therapist is a member of a medical team whose purpose is to restore maximum function to mentally or physically disabled patients. This team may include doc-

tors, nurses, social workers, physical therapists, and other specialists. After a physician makes his diagnosis and outlines a course of treatment for a patient, an occupational therapist selects and directs functional, recreational, educational, and vocational activities designed to meet the specific needs.

\* Prepared by the Women's Bureau, U.S. Department of Labor.





Courtesy of U.S. Department of Health, Education, and Welfare

*Occupational therapist directing handicapped children in play therapy and activities in daily living.*

Occupational therapists may employ several types of therapy to attain the rehabilitation goals set for patients. These goals may include the restoration of physical, mental, or emotional stability; combating boredom during a long-term illness; aiding in developing maximum self-sufficiency in activities of daily living (such as eating, dressing, writing, and using a telephone); and helping patients, in the latter stage of treatment, to perform jobs in a practical work situation.

Traditionally, occupational therapists have taught manual and creative arts such as weaving, clay modeling, and leatherworking. Today, business and industrial skills such as typing, operation of a key punch machine, and the use of power tools have been added. Occupational therapists may be required to design and make special equipment or splints to aid patients in performing their activities. Other duties may include supervision of volunteer workers, student therapists, and occupational therapy assistants who give instructions in a particular skill.

A chief occupational therapist in a hospital may teach classes composed of medical students and graduate and student nurses. Some occupa-

tional therapists have administrative duties as directors or assistant directors of occupational therapy programs, and others may teach courses in occupational therapy.

### Where Employed

Most occupational therapists work in hospitals and other health institutions, such as school clinics, nursing homes, sanatoriums, and homes for the aged. Some are employed in special workshops, rehabilitation centers, camps for handicapped children, and in State health departments. A few occupational therapists are employed in home-visiting programs for patients unable to attend clinics or workshops.

More than one-fourth of all occupational therapists work with psychiatric patients, and another fourth work with persons having physical disabilities (including general medical and surgical patients). Approximately one-fifth work with children (including those with cerebral palsy). Others work with tuberculosis patients or older persons, or they teach courses in occupational therapy.

The exact number of occupational therapists is not known, but in 1960 about 6,300 were registered with the American Occupational Therapy Association. In 1959, hospitals employed nearly 5,500 occupational therapists and the Federal Government employed about 550. In addition, well over 100 occupational therapists were on active military duty.

The great majority of occupational therapists are women. However, in recent years more men have been entering the field. In the spring of 1960, about 75 men were enrolled in occupational therapy courses.

### Training, Other Qualifications, and Advancement

A general requirement for entry into the profession is graduation from a college or university offering courses in occupational therapy approved by the Council on Medical Education and Hospitals of the American Medical Association. In 1960, 32 such colleges and universities offered courses leading to a bachelor of science or bachelor of arts degree with a major in occupational therapy. These courses emphasize

the health sciences and the application of occupational skills.

In addition to the 4 years of academic work, a clinical training period—9 to 10 months of supervised practice in hospitals or health agencies—is required to qualify for professional registration. Some colleges permit their students to take the clinical practice during the summer and/or during part of their senior year in college.

Half of the schools with approved programs accept college graduates with training in other fields and allow them to earn a certificate in occupational therapy upon completion of 18 months' specialized training.

The Army, Navy, and Air Force offer programs whereby persons who satisfy basic requirements for a commissioned officer and have a college major in occupational therapy may receive the clinical part of their training while serving in the Armed Forces.

Upon graduation and completion of a clinical training period, therapists are eligible to take the examination for professional registration given semiannually by the American Occupational Therapy Association. Persons who successfully complete this examination may use the initials O.T.R. (Occupational Therapist Registered) after their names. Some hospitals require that their occupational therapists be registered.

Five institutions offer a program leading to a master's degree in occupational therapy for persons who are registered occupational therapists. Some occupational therapists have earned advanced degrees in allied fields, such as in guidance and counseling, education, psychology, rehabilitation, or sociology. Persons working for the master's degree often are interested in teaching, research, or administrative work.

A number of colleges and universities offer scholarships to students interested in becoming occupational therapists, as do private and governmental agencies.

A few colleges and health agencies offer advanced courses in the treatment of special disabilities, such as those resulting from cerebral palsy and poliomyelitis, for graduates of approved curriculums. Some institutions provide

continuous inservice educational programs for their occupational therapists.

Programs have been set up in some areas for the training of occupational therapy *assistants* who work under the direct supervision of a registered therapist. To be eligible for the 12-week minimum program for assistants, applicants must be at least 18 years of age, have a high school education, be in good physical health and emotionally stable, and have the ability to work well with others.

Occupational therapists without experience usually begin as staff therapists and may qualify as senior therapists after several years on the job. Experienced therapists may become directors of occupational therapy programs in large hospitals, clinics, or workshops, or may become teachers. A few positions are available as program coordinators and as consultants with large institutions and agencies.

Personal characteristics needed in this profession are emotional stability, physical stamina, a cheerful personality, a genuine liking for people, a sincere interest in medical work, and a sympathetic but objective approach to illness and disability. Manual dexterity, ingenuity, and imagination are also needed.

### Employment Outlook

Opportunities for occupational therapists are expected to be excellent during the 1960's. Currently, there is a serious shortage of these workers. The greatest demand is in and near metropolitan areas where medical and health facilities are generally located.

The demand for occupational therapists has been increasing due to the increased public interest in the rehabilitation of disabled persons and the demonstrated success of occupational therapy programs in restoring people to health. There are opportunities for work with psychiatric patients, children, and aged persons, as well as those with persons suffering from cerebral palsy, poliomyelitis, tuberculosis, and heart disease. Since active military personnel and their dependents, including wives, children, and parents, may be treated in military hospitals, military occupational therapists are assured of a wide range of experience.

Several measures have been taken to help alleviate the shortage of fully trained personnel. Although hospitals and other employers prefer to hire registered occupational therapists, the continued shortage has led to the employment of therapists who are not registered. In addition, some qualified personnel have been employed on a part-time basis. Approximately 6 percent of the nearly 5,500 occupational therapists in hospitals in 1959 were employed part time.

In 1960, 353 persons earned degrees in occupational therapy. Almost all of these were bachelor's degrees; only 1 percent was a master's. Men received only 3 percent of all degrees. Despite the increasing number of persons enrolled in occupational therapy courses, classes were not filled to capacity in the school year 1960-61.

### Earnings and Working Conditions

Salaries of occupational therapists ranged from approximately \$4,200 to \$10,000 in late 1959, according to the American Occupational Therapy Association. Staff therapists were most frequently paid salaries of \$4,200 to \$4,700 a year, while senior therapists reported earnings of \$4,700 to \$5,500. Directors of occupational therapy programs with 4 or more years' ex-

perience received from \$5,500 to \$7,000; a few coordinators or consultants earned between \$6,000 and \$10,000 a year.

In the Federal Government, the beginning salary for an occupational therapist without experience in 1961 was \$4,345; those with at least 1 year of experience started at \$5,355. The highest salary in 1959 was about \$9,000, with the average at \$5,706.

Most occupational therapists work an 8-hour day, 40-hour week, with evening work required in a few organizations. Vacation leave for therapists usually ranges from 2 to 4 weeks a year. Many positions offer health and retirement benefits.

### Where To Go for More Information

Additional information on occupational therapy is available in the following publication:

The Outlook for Women as Occupational Therapists (Women's Bureau Bull. 203-2, Revised, 1952). Superintendent of Documents, Washington 25, D.C. Price 20 cents.

Detailed information on the field, on colleges offering approved programs, and on scholarships can be obtained from:

American Occupational Therapy Association,  
250 West 57th St., New York 19, N.Y.

## Podiatrists

(New D.O.T. 0-39.901)

### Nature of Work

Podiatrists (also called chiropodists) diagnose and treat diseases and deformities of the feet. They perform minor surgery, use drugs and physical therapy, prescribe proper shoes, and fit corrective devices. To help in diagnoses, they also take X-rays of the feet and utilize blood and other tests. Among the conditions podiatrists treat are corns, bunions, calluses, ingrown toenails, skin and nail diseases, deformed toes, and shortened tendons. They refer patients to physicians whenever they observe symptoms in the feet and legs that may be evidence of diseases—such as arthritis or heart

or kidney trouble—which also affect other parts of the body.

As a rule, podiatrists provide most types of foot care. Some of them, however, prefer to treat particular ailments, and others devote most of their practice to children. A few act as consultants to shoe manufacturers, and some do research or teach in colleges of podiatry-chiropody.

### Where Employed

Nearly all of the 7,600 podiatrists who were actively engaged in the profession in early 1961 were in private practice. The few who held



*Podiatrist using model of patient's foot to explain proposed treatment.*

full-time salaried positions worked mainly in hospitals or podiatry colleges, or for other podiatrists. Some were commissioned officers in the Army and Navy. Women represented between 3 and 4 percent of the profession.

Podiatrists practice mainly in large cities. More than half are in five of the most heavily populated States—New York, Pennsylvania, Illinois, California, and Ohio. There are many small towns and rural areas, especially in the South and the Northwest, where there are no podiatrists.

#### **Training, Other Qualifications, and Advancement**

All States and the District of Columbia require a license for the practice of podiatry. To qualify for a license, an applicant must have had at least 1 year—in some States, 2 years—of preprofessional college education, have graduated from an accredited college of podiatry-chiropraxy, and must pass a State board examination. In addition, four States—Michigan, New Jersey, Rhode Island, and West Virginia—require applicants to have completed a 1-year internship in a hospital or clinic after graduation from a podiatry college; the State of Oklahoma requires those seeking a license to have completed 1-year of practice under the direct supervision of an experienced podiatrist. Over half the States grant licenses without further examination to podiatrists already licensed by another State.

The five accredited podiatry colleges in the United States have differing entrance requirements. Two will admit only students who have completed at least 2 years of college; the others require only 1 year. This education must include courses in English, chemistry, biology or zoology, and, in some instances, also physics or mathematics.

The first 2 years of podiatry training are devoted chiefly to classroom instruction and laboratory work in such basic sciences as anatomy, bacteriology, chemistry, pathology, and physiology, though in the second year students obtain some limited experience in the school clinics. During the final 2 years, students spend most of their time obtaining clinical experience. The degree of Doctor of Podiatry (Pod.D.) or Doctor of Surgical Chiropraxy (D.S.C.) is awarded upon graduation. Additional education and experience are necessary to qualify for membership in any one of the five professional groups recognized by the American Podiatry Association: American College of Foot Surgeons, American College of Foot Orthopedists, American Society of Chiropraxical Roentgenology, American Board of Chiropraxical Dermatology, and the American Association of Hospital Podiatrists.

Among the personal qualifications considered desirable for a career in this profession are scientific aptitude, manual dexterity, and a good business sense. The ability to get along well with people is also important.

Most newly licensed podiatrists open their own offices or purchase established practices. Some begin by taking salaried positions in hospitals, or with podiatrists already in practice, to gain experience and to save the money needed to equip an office. Podiatrists entering the Army or Navy are commissioned as second lieutenants or ensigns and may progress to higher ranks if they make the service a career.

#### **Employment Outlook**

The employment outlook for podiatrists is expected to be good through the mid-1960's, especially in those parts of the country where the services of podiatrists are widely used. New graduates of colleges of podiatry should

generally be able to find favorable opportunities for establishing practices and some will also have opportunities for salaried employment. In 1961, the American Podiatry Association reported that there were unmet needs for podiatrists in some parts of the country. This situation was expected to continue during the 1960's even if enrollments in podiatry colleges rise substantially. In recent years, the number of new graduates has only slightly exceeded the number needed to replace members of the profession who retire or die.

In the long run, the demand for podiatrists' services is likely to grow, along with the demand for other health care. The rising population and the growing proportion of older people are two factors pointing in this direction; in 1961, the American Podiatry Association estimated that over half the population, particularly people in the older age groups, need podiatrists' services. In addition, the trend toward providing preventive foot care in schools and factories is likely to continue, and additional podiatrists may be needed to fill salaried positions with organizations that provide all kinds of health services.

Location is one of the major factors in determining success of podiatrists opening their own offices. A practice can be developed most quickly in small cities and suburban areas, where the new podiatrist can easily become

known in the community and where there is less competition from established practitioners.

### **Earnings and Working Conditions**

In podiatry, as in many of the other professions, incomes usually rise markedly after the first years of practice. Earnings of individual podiatrists are determined mainly by such factors as ability, experience, the income level of the community served, and location. In 1959, the average income above expenses for self-employed podiatrists was \$10,364, according to a survey by the American Podiatry Association.

Podiatrists do not have a standard workweek but set their hours to suit the needs of their practice. Their average workweek in 1959 was about 38 hours, according to the Association's survey.

### **Where To Go for More Information**

Current information on the requirements for licensure in a particular State may be obtained from the State board of examiners in the State capital. Information on entrance requirements, curriculums, and scholarships is available from the colleges of podiatry-chiropractic. Additional information on podiatry as a career, as well as a list of accredited colleges, may be obtained from:

American Podiatry Association,  
3301 16th St. NW., Washington 10, D.C.

## **Dental Hygienists \***

(D.O.T. 0-50.07)

### **Nature of Work**

Dental hygienists contribute to oral health by helping to prevent tooth decay and promoting better mouth care. Working under the supervision of licensed dentists, dental hygienists clean teeth by removing stains and calcium deposits, polish teeth, and massage gums. While performing this work—called “oral prophylaxis”—they chart conditions of decay and disease for final diagnosis by the dentist. Dental hygienists also instruct pa-

tients on the techniques of mouth care and proper diet and, in many localities, they apply stannous or sodium fluoride solution to children's teeth to aid in the prevention of decay.

Dental hygienists who work in private dental offices may also take and develop dental X-rays, mix filling compounds, prepare solutions, sterilize instruments, and act as chair-side assistants to the dentists. They may also make appointments, receive patients, order and maintain instruments and supplies, and keep records.

One of the chief responsibilities of dental

\* Prepared by the Women's Bureau, U.S. Department of Labor.



Courtesy of U.S. Public Health Service

*Dental hygienists spend much of their time working with children.*

hygienists employed by school systems is to promote proper care of teeth among children. Hygienists periodically examine children's teeth and report their findings to parents. They also perform oral prophylaxes for children and give classroom instruction on correct toothbrushing technique. They give talks on good nutrition and its influence on dental health. They may also help to develop classroom projects or assembly programs on oral health.

Dental hygienists employed as consultants by public and private health agencies engage in dental health projects or perform clinical duties. A few assist in research projects. Dental hygienists with advanced training may teach in schools of dental hygiene.

### Where Employed

About 10,000 dental hygienists were in practice in the United States in 1960; almost all were women. The majority of hygienists work in the eastern section of the country. However, the number employed in other areas has been growing during the past decade.

Most dental hygienists are employed in private dental offices. About one in four works for a public health agency or a school system. A few dental hygienists work in industrial plants, union-sponsored clinics, on the staffs of hos-

pitals and dental hygiene schools, and as civilian employees of the Armed Forces.

### Training and Other Qualifications

Dental hygienists must be licensed by the State Board of Examiners in the State in which they wish to practice. Eligibility for the licensure examination is limited to graduates of dental hygiene schools in all but two States (Alabama and Georgia). The examinations consist of both written and practical clinical tests. Although examination fees range from \$10 to \$75, most commonly they are \$25 or less. Upon passing a licensure examination, a hygienist becomes a Registered Dental Hygienist (R.D.H.) in the State in which the examination was taken. Periodic registration, at a fee, is also required in most States. To relocate for practice in a different State, a licensed dental hygienist usually must take another examination.

In 1960, 33 schools of dental hygiene, located in 23 States and the District of Columbia, were accredited by the Council of Dental Education of the American Dental Association. These schools provide either a basic 2-year dental hygiene certification course or a 4-year program leading to a bachelor's degree. Most schools offer the 2-year curriculum, a few offer the degree course only, and more than a third offer both programs.

For dental hygienists interested in practicing in a private dental office, completion of the 2-year certification program is usually sufficient. Those who wish to work in public health or school programs, research, or teaching generally are required to complete the 4-year program.

The minimum requirement for admission to a school of dental hygiene is graduation from an accredited secondary school in a college preparatory course or its equivalent. Several schools which offer the bachelor's degree admit students to the dental hygiene program only after they have completed 2 years of college study in liberal arts. Most schools also require that students take aptitude tests, conducted by the American Dental Hygienists' Association,

to demonstrate their suitability for dental hygiene work.

The basic curriculum at a school of dental hygiene consists of courses in the basic sciences, dental sciences, and liberal arts. Classroom instruction, laboratory study, and clinical experience are combined to provide the prospective dental hygienist with the basic knowledge and skill essential to her job. The student learns the basic procedures performed by the dental hygienist and develops the manual dexterity and attentiveness to detail essential in this work. Classroom work includes subjects such as anatomy, chemistry, histology, pathology, pharmacology, English, and speech.

The average cost of 2 years' education in dental hygiene, not including living expenses, was slightly more than \$1,200 in late 1959, according to a survey conducted by the Council on Dental Education of the American Dental Association. Tuition, instruments, textbooks, supplies, and special fees ranged from a total of \$375 to \$2,492. Scholarships and loans are available at many schools; however, they are usually limited to second-year students. The Public Health Traineeship Program of the U.S. Department of Health, Education, and Welfare provides tuition and modest living expenses for graduate or specialized public health training.

A personal attribute particularly desirable for dental hygienists is the ability to work well with people. Sympathy, understanding, and patience also are important.

### Employment Outlook

The current shortage of qualified dental hygienists is expected to continue during the 1960's. In recent years, between 900 and 1,000 dental hygienists have been graduated annually from approved schools. Although this is double the number graduated in 1950, there are still twice as many job openings as can be filled. Many openings are created by turnover among young women who leave their jobs for marriage and family responsibilities. According to a 1959 survey made by the American Dental Association, fewer than one out of seven dentists in private practice employed dental

hygienists. In the future, many more dentists are expected to employ dental hygienists to do preventive work.

A further need for the services of hygienists will result from an expanding population with higher incomes and educational levels. Growing interest in dental care programs for children will lead to more employment opportunities for dental hygienists in school systems. Greater participation in prepayment plans, industrial and union dental programs, and the growth of group practice among dentists should also result in additional jobs.

Mature women who wish to return to the profession can expect to find good opportunities for employment. In addition, as a result of expanding demand, schools are studying methods of recruiting a larger percentage of older women for initial training in dental hygiene.

### Earnings and Working Conditions

Earnings of dental hygienists—like those in many other occupations—are influenced by the type of employer, education and experience of the individual hygienist, and the part of the country in which the job is located. Dental hygienists working in private dental offices are most often salaried employees, though some are paid a commission for work performed or a combination of salary and commission.

More than four-fifths of all dental hygienists employed full time had annual incomes of between \$2,000 and \$8,000, according to a 1960 study made by the Commission on the Survey of Dentistry of the American Council on Education. The average annual salary of a dental hygienist employed full time in a private dental office was \$4,396 in 1958, according to a survey conducted by the American Dental Association. Authorities in the field estimated that hygienists employed in large metropolitan centers earned between \$100 and \$125 a week in 1960. Dental hygienists employed in research, administrative, supervisory, or teaching positions often earned higher salaries.

The entry salary for a dental hygienist employed by the Federal Government is either \$4,040 or \$4,345 a year, depending on education and experience. The average annual salary



of hygienists employed by the Federal Government in 1959 was \$4,414.

Dental hygienists employed full time in private offices usually work between 35 and 40 hours a week. They may work on Saturdays or during evening hours. In order to have a full workweek, some hygienists work for two or more dentists. Many hygienists combine part-time jobs in private dental offices with home responsibilities. Those employed by the Federal Government, other public agencies, or by private organizations, work the number of hours scheduled by those organizations.

Working conditions are pleasant. The hygienist generally provides her own white uniform, cap, and shoes. Regular medical check-ups and strict adherence to establish procedures for using X-ray equipment and for disinfection are important health protections for persons in this occupation.

A paid vacation of 2 or 3 weeks is common in most dental offices in which hygienists work for a salary. Those working part time or for a commission generally have no paid vacation. Dental hygienists employed by school systems and public or private health agencies have the usual vacation, sick leave, and retirement benefits of such organizations.

#### Where To Go for More Information

Information about approved schools, education requirements, and job opportunities may be obtained from the following organization:

American Dental Hygienists' Association,  
100 East Ohio St., Chicago 11, Ill.

Information concerning licensing requirements can be obtained from the State Board of Dental Examiners in the State in which a dental hygienist wishes to practice.

### Dietitians \*

(D.O.T. 0-39.93)

#### Nature of Work and Where Employed

Dietitians are generally responsible for planning and supervising the preparation and serving of appetizing and nutritious meals to help people maintain or recover good health. Their work usually includes the planning of menus or modified diets, supervision of the food personnel who prepare and serve the meals, management of purchases and accounts, and promotion of good eating habits.

Probably about 25,000 persons were employed as dietitians in 1959, of whom approximately 5 percent worked part time. Although substantial numbers are employed in industrial plants and commercial eating places, about half of all dietitians are estimated to be engaged in hospital work. Nearly 6,300 of these hospital dietitians were certified by The American Dietetic Association. (For further information on certification, see the section on Training.) All of the four major types of specialists to be found among professional dietitians are employed by hospitals.

*Administrative dietitians*, the largest group, administer and direct food-service programs in either public or private establishments. The majority of administrative dietitians work in



*In hospitals, dietitians supervise the serving of modified-diet meals.*

\* Prepared by the Women's Bureau, U.S. Department of Labor.



hospitals, but some are also employed in colleges and universities; school food-service programs; company-operated cafeterias; commercial restaurants, tearooms, and other cafeterias; camps; homes for children or the aged; and on airlines, steamships, and railroads. Applying the principles of nutrition to large-scale meal planning and cooking, they supervise the preparation of meals which are nutritious, well-balanced, and appetizing. In performing their job, the staff dietitians select, train, and direct food-service workers; arrange for the purchase of food, equipment, and supplies; enforce sanitary regulations; and prepare records and reports for management or for evaluation purposes. Directors and assistant directors of a dietary department also formulate departmental policy, coordinate dietary service with the activities of other departments, and are responsible for the development and management of the dietary department budget, which in large hospitals may run into millions of dollars annually.

Dietary consultants, employed by State health departments or other public agencies, visit a number of public hospitals, institutions, and sanatoriums to provide technical advice on the maintenance of adequate diets for patients, methods of food preparation, food-service operation and management, selection and purchases of food and equipment, and kitchen layouts.

*Therapeutic dietitians*, usually employed in hospitals and clinics, plan meals for patients including those who have been placed on modified diets by their doctors for treatment of such illnesses as diabetes, tuberculosis, or ulcers. They also supervise the serving of meals and discuss food likes and dislikes with patients. Other duties of therapeutic dietitians include instructing patients and their families on the requirements and importance of their modified diets and suggesting ways for them to stay on these diets after leaving the hospital. Therapeutic dietitians who work primarily with out-patients in hospital clinics are usually called clinic dietitians. In the clinics, they discuss dietary needs and problems, including diets suitable at home, with individual patients or with groups of patients, such as expectant mothers or overweight people.

*Teaching dietitians* are employed by hospitals, colleges, and universities to instruct classes in such subjects as dietetics, foods and nutrition, diet therapy, menu planning, budgeting, and institution management. The students may be dietetic interns, student nurses, medical or dental students, dietary employees, or others. Besides classroom work, teaching dietitians supervise dietetic interns in the performance of their practical training. They also conduct less formalized and continuous in-service training for food-service workers, and may also provide dietary instruction to individuals or groups of patients.

*Research dietitians* conduct experiments or surveys in food and nutrition to learn how foods can aid in the treatment of disease and in helping persons to attain and maintain good health. Generally they work as members of medical teams, composed of doctors, nurses, physiologists, psychologists, chemists, and others. Sponsored largely by government agencies, universities, large hospitals, and commercial organizations, much dietary research is currently directed at the nutritional needs of the aging and persons with chronic diseases. Some dietitians are engaged in research in an effort to solve the problems of space-travel nutrition and discover new sources of food for the future.

#### **Training, Other Qualifications, and Advancement**

Educational preparation recommended for a professional dietitian is college study leading to a bachelor's degree plus 1 year as a dietetic intern. Undergraduate work should include courses in foods and nutrition, institution management, chemistry, bacteriology, and physiology, as well as such related courses as psychology, sociology, and economics. During the school year 1959-60, 670 bachelor's degrees, 109 master's degrees, and 14 doctorates were granted to graduates who majored in foods and nutrition and institution management.

College graduates who meet specific academic requirements may enroll in 1 of the 65 dietetic internship programs approved by The American Dietetic Association. During the school year 1960-61, about 600 dietetic interns were enrolled in approved programs. As there was room for

about 200 more interns, the existing internship programs were filled, on the average, to only three-fourths of capacity. Scholarships and loans are available to dietetic interns in numerous programs.

Internships are conducted in three types of establishments: In hospitals (which emphasize food-service administration and therapeutic dietetics), in business and industrial firms (which emphasize food-service administration), and in nutrition clinics (which emphasize nutrition education and therapeutic dietetics). Most of the interns' education is gained from on-the-job experience under the supervision of a qualified dietitian. The remainder of their internship is spent in the classroom and on special projects. Interns may be provided room, board, and some laundry service without cost, and they usually receive a monthly stipend.

The Veterans Administration, the largest single employer of dietitians (about 960 in 1960), pays dietetic interns for the time they work at the rate of \$4,345 a year for a 40-hour week. Some of the VA hospitals offer dietetic interns living quarters and meals for a nominal charge. Interns commissioned as second lieutenants and ensigns in the Armed Forces receive \$4,063 a year, including subsistence and quarters allowance and a \$300 uniform allowance when commissioned and called to active duty. The Army conducts two approved internship programs; the Navy and the Air Force allow interns to participate in approved civilian internships. In return for this training, these interns are required to serve 2 years of active duty.

Many employers give hiring preference to dietitians who have completed an approved internship because they consider it evidence of adequate training. However, 3 years of experience as a dietitian is usually considered acceptable if at least 1 year of work has been supervised by a member of The American Dietetic Association. Either of these two methods of preparation makes a dietitian eligible for membership in the Association.

Some junior colleges and vocational schools offer 2 to 3 years of training in dietetics, but this schooling is not considered adequate for professional work. Graduates of these programs

may obtain employment as food-service supervisors.

In addition to acceptable training, other essential requirements for work in the field of dietetics are a strong interest in and an aptitude for the sciences, particularly chemistry and mathematics. Good physical stamina is also needed, as well as ability to organize and manage work programs and to work with others. Young people who wish to test their interest in and adaptability to this profession will find it helpful to have summer-work experience in a hospital department of dietetics.

Experienced dietitians have good opportunities for advancement either in their own field or in related work. After a few years of experience, a dietitian may be eligible for promotion to director or assistant director of dietetics. Those engaged in teaching or research usually find it necessary to do graduate work in order to advance to higher level jobs as supervisors or specialists in their field.

Persons interested in becoming public health nutritionists usually earn a graduate degree in public health nutrition in 1 of the 12 colleges and universities offering this type of training. Graduate study in nutrition and related subjects may lead to a variety of interesting and rewarding positions such as research nutritionist, nutrition consultant, or nutrition teacher.

### **Employment Outlook**

Opportunities for qualified dietitians are expected to continue to be excellent throughout the 1960's. It has been estimated that about 2,000 dietitians will need to be recruited yearly. New and expanding hospital facilities and more widespread use of hospitals and medical services for the increasing population will intensify the present need for dietitians in hospitals. Moreover, an increasing number of dietitians will be recruited to direct food services for industrial feeding programs and commercial eating places. Expansion of school food-service programs will also affect the demand.

Many young women select this field of study because of their interest in food and homemaking and leave the profession for marriage and family responsibilities. As a result, there

is a significantly large replacement need. The current number of people graduating from dietetic internships amounts to approximately one-third of the yearly need.

Because of the present shortage, some hospitals and other establishments are hiring college graduates with suitable undergraduate education to assist a member of The American Dietetic Association and thereby gain the qualifying experience needed to become professional dietitians. Small hospitals and institutions which do not require the services of a full-time dietitian are hiring dietitians on a part-time basis. Some of these dietitians are married women who have returned to work. In addition, a number of dietitians, particularly those living in rural areas, find it advantageous to work part time for each of several institutions in their area.

The number of men engaged in dietetics, although small at present, is gradually increasing and is expected to continue to rise as a result of the greater emphasis on a dietetic background for work in the restaurant and hotel management field.

#### **Earnings and Working Conditions**

In a survey of hospital employees' salaries in 15 metropolitan areas during mid-1960, dietitians averaged from \$75.50 to \$102.50 a week, or from \$3,926 to \$5,330 a year.

Salaries offered in hospitals in 1960 ranged from about \$4,200 to \$5,400 for inexperienced graduates of approved dietetic internship programs and from \$5,300 to over \$10,000 for qualified dietitians with experience, according to The American Dietetic Association. Openings for dietitians in industrial companies, as listed with the Association, specified annual salaries averaging about \$4,500 in 1960. College food services offered salaries ranging from \$3,800 to \$6,000 for staff assistants and from \$6,000 to \$10,000 for directors. Supervisors of

school lunch service programs received between \$5,000 and \$9,000, and teachers in colleges and universities between \$5,000 and \$10,000.

In Veterans Administration hospitals, where the majority of the Federal Government dietitians work, and in the U.S. Department of Health, Education, and Welfare, which employs most of the others, the entrance salary for internship graduates without experience was \$5,355 in 1961. Federal salaries increase with the amount of experience and level of responsibility, ranging up to \$15,030 for administrators and specialists.

Dietitians with the rank of second lieutenant or ensign in the Armed Forces and junior assistants in the commissioned corps of the U.S. Public Health Service receive a starting salary of \$4,063 including subsistence and quarters allowances; following 18 months of satisfactory duty, a dietitian is qualified for promotion to the next rank at \$4,612.

Most dietitians work a regular 40-hour work-week. However, dietitians in hospitals may sometimes have to work weekends, and dietitians in restaurants and cafeterias have somewhat irregular hours. Rooms, laundry service, and meals are sometimes provided in addition to cash salaries. Paid vacations and holidays as well as sickness and retirement benefits are usually received.

#### **Where To Go for More Information**

The U.S. Civil Service Commission, Washington 25, D.C., has information on the requirements for dietetic interns and dietitians in Federal Government hospitals.

Further information on approved colleges and dietetic internship programs, available scholarships, and employment opportunities may be obtained from:

The American Dietetic Association,  
620 North Michigan Ave., Chicago 11, Ill.

## Physical Therapists \*

(D.O.T. 0-39.935)

### Nature of Work

Physical therapists (sometimes called physiotherapists) help persons with muscle, nerve, joint, or bone diseases or injuries to overcome such disabilities. Carrying out physicians' instructions, physical therapists treat a variety of disorders through physical exercise, mechanical apparatus, and applications of massage, heat, light, water, or electricity. These disorders include physical injuries, deformities, and disabilities resulting from such diseases as poliomyelitis, cerebral palsy, and arthritis. Most of the patients are accident victims, crippled children, and disabled veterans.

To obtain information needed in developing a treatment program, physical therapists perform muscle and nerve tests. They also keep records of their patients' progress during treatments. In many instances, disabled persons must be helped to accept their physical handicaps and learn how to live with their limitations. An important aspect of a therapist's job is teaching patients how to use and care for braces, crutches, and artificial limbs. In addition, they show patients and their families how to continue treatments at home.

Physical therapists may instruct physical therapy students, students of related professions, or nonprofessional personnel (such as physical therapy assistants and orderlies). In order to integrate their work with that of other staff members of a rehabilitation team, they also attend conferences at which the progress of patients is discussed. Such a team is directed by a physician and may include a teacher, nurse, clinical social worker, occupational therapist, psychologist, speech therapist, recreational worker, and vocational counselor, in addition to a physical therapist.

Although qualified physical therapists may treat all types of patients, some specialize in working with children, veterans, amputees, paraplegics, or victims of poliomyelitis, cerebral palsy, arthritis, or muscular dystrophy.



*Physical therapist helping polio patient regain sense of balance with walker.*

### Where Employed

An estimated 8,000 qualified physical therapists were employed in 1960; of these about 80 percent were women. In recent years, the number of men entering this occupation has been growing.

The majority of physical therapists work in hospitals. About half of this group are employed by private, nonprofit hospitals; approximately one-fourth in hospitals run by State or local governments; and most of the remainder in Federal Government hospitals—operated primarily by the Veterans Administration, the Armed Forces, and U.S. Public Health Service. Most hospitals employing physical therapists are general hospitals, but some specialize in care for pediatric, orthopedic, psychiatric, or chronically ill patients. Many small community hospitals also employ physical therapists. The American Hospital Association has reported that approximately two-fifths of the hospitals surveyed in 1959 had physical therapy facilities.

\* Prepared by the Women's Bureau, U.S. Department of Labor.

More than one-fourth of the physical therapists were employed by rehabilitation or treatment centers, schools or societies for crippled children, and public health agencies. Most of these organizations provide regular treatment for patients with chronic diseases, and some have home visiting programs.

The remainder work in physicians' offices or clinics, teach physical therapy, or perform research relating to treatment procedures or in such basic sciences as anatomy or physiology. A few physical therapists serve as directors or coordinators of departmental programs in large hospitals and rehabilitation centers or as consultants in government and voluntary agencies.

### **Training and Other Qualifications**

Professional education for physical therapists may be obtained in any of 42 schools of physical therapy (including the Army Medical Service School) which have been approved by the American Medical Association (AMA) in collaboration with the American Physical Therapy Association. The majority of approved schools are part of large universities. Most of the others are operated by hospitals, which usually have university affiliations.

All the physical therapy schools except the Army Medical Service School offer 4-year programs leading to a bachelor's degree. These programs are open to high school graduates, as well as to college students who have completed certain required science courses. A student in the latter group can earn a degree in less than 4 years if previous college work satisfies the course requirements of the physical therapy school.

All but 14 of the approved schools also offer 12- to 16-month courses leading to a certificate in physical therapy. Entrance requirements for admission to certificate courses vary somewhat but generally include possession of a baccalaureate degree with undergraduate courses in specified biological, physical, and social sciences.

The curriculum of approved schools covers the sciences and skills basic to physical therapy, including anatomy, physiology, pathology, clinical medicine, and psychology, as well as techniques of electrotherapy, radiation therapy,

hydrotherapy, massage, and exercise. In addition to classroom instruction, students are assigned to a hospital or treatment center for supervised clinical experience in the care of patients.

Annual tuition in schools of physical therapy ranges from \$140 in a State university (for State residents) to a maximum of \$1,400 in a private university. Many organizations, as well as schools of physical therapy, offer scholarships to students planning careers in physical therapy. The principal source of scholarship funds is The National Foundation, which offers Health Scholarships to high school seniors planning health careers. These scholarships are renewable annually for 4 years.

Graduation from an AMA-approved school of physical therapy is considered essential for a career in this profession. It is required for membership in the American Physical Therapy Association (APTA), for registration with the American Registry of Physical Therapists, and may be necessary for licensure or registration in some States. In 1960, 36 States required licensing or registration of physical therapists. Most employers, particularly large hospitals and organizations, hire only therapists who are graduates of AMA-approved programs.

Qualified therapists may take advanced degree programs in physical therapy or in related subjects such as anatomy, physiology, or administration. Several universities now offer a master's degree in physical therapy. Graduate education combined with clinical experience greatly increases the opportunities for advancement to positions of responsibility and leadership in teaching, research, and administration, as well as in the treatment area of physical therapy.

Important characteristics needed by physical therapists include emotional stability, a moderate amount of manual dexterity, and a desire to help people. Since an important part of a therapist's job is helping patients and their families understand the treatments given and preparing them emotionally for the changes that occur, therapists must demonstrate patience, resourcefulness, and a sympathetic attitude toward people. Their work also requires good verbal expression in giving instructions

and the ability to plan and organize time, material, and work output. In addition, good health is essential for all physical therapists.

For those wishing to determine whether they have the personal qualities needed for a career in physical therapy, summer or part-time work as a volunteer in the physical therapy department of a hospital or clinic may prove helpful.

### Employment Outlook

Employment opportunities for physical therapists are expected to remain excellent throughout the 1960's. It is estimated that at least 3,000 additional physical therapists will be needed each year through the middle of this decade. More new positions will be created as present rehabilitation centers are enlarged and new ones are built to meet the demands of the growing population and increasing public interest in the rehabilitation of handicapped persons. In addition, a sizable number of vacancies arise each year from turnover of personnel in this occupation, especially since these workers include many young women who may leave the profession for marriage and family responsibilities.

Crippled children's programs and vocational rehabilitation activities in which States are assisted by Federal funds, and possible expansion of public health services at the State, county, and municipal levels will further add to the demand for physical therapists during the 1960's. More physicians are expected to recommend physical therapy for patients, as techniques and equipment for treating many diseases are improved. Currently, an estimated 28 million Americans are disabled; within a year, 50,000 more will have suffered disabling diseases or injuries and will need physical therapy.

The demand for physical therapists continues despite the fact that the number of graduates from approved schools has almost tripled in the past 19 years, rising from 238 in 1941 to 682 in 1960. Facilities for more students are available, as it was reported that during the academic year 1960, approved courses in physical therapy were filled, on the average, only to three-fourths of capacity.

Many opportunities for advancement to posi-

tions of leadership and responsibility in this profession will exist during the 1960's. Many jobs such as coordinator, program director, consultant, and teacher will be open to qualified physical therapists.

Part-time work is available in many communities. In 1959, nearly one-tenth of the physical therapists working in hospitals were employed in part-time positions. These are particularly attractive to married women who have physical therapy training and wish to return to this type of work but cannot do so on a full-time basis.

### Earnings and Working Conditions

Average salaries of physical therapists (including both beginning and experienced workers) employed in hospitals in 13 metropolitan areas, surveyed in mid-1960, ranged between \$77.50 a week (\$4,030 a year) in Boston and \$103 a week (\$5,356 a year) in the Los Angeles-Long Beach area.

Inexperienced physical therapists averaged \$4,250 in 1959, according to the APTA. Some salaries were supplemented by maintenance and/or meals and by the laundering of uniforms. Working chiefly for the Veterans Administration and U.S. Public Health Service, physical therapists in the Federal Government in 1961 received starting salaries of between \$4,345 and \$6,435, depending upon previous experience. At the same time, an entrance salary of \$4,063 (including rental and subsistence allowances) was paid to physical therapists with a second lieutenant or ensign rating in the military services and also to junior assistants in the commissioned corps of the U.S. Public Health Service.

The average (median) salary of supervisors, as reported by the APTA, was \$6,250 in 1959. For those employed as physical therapy directors or coordinators, salaries started at about \$7,000 a year and increased with experience, competence, and responsibility.

A 1959 study of the APTA indicated that most physical therapists worked 44 hours or less a week. Almost all were receiving 2 or more weeks' vacation. The majority of physical therapists received sick leave benefits, and many were also covered by retirement plans.

**Where To Go for More Information**

Additional information concerning women as physical therapists is available in a U.S. Department of Labor, Women's Bureau publication, *The Outlook for Women as Physical Ther-*

*apists*, Bulletin No. 203-1, Revised, 51 pp. Washington, D.C. 1952. Price 20 cents.

Information may also be obtained from:

American Physical Therapy Association,  
1790 Broadway, New York 19, N.Y.

**Medical Record Librarians \***

(D.O.T. 0-23.25)

**Nature of Work**

Medical record librarians are responsible for the planning, preparation, maintenance, analysis, and use of records and reports on patients' illnesses and treatments.

As a member of a professional team, the medical record librarian may be engaged in several areas of work, such as assisting the medical staff in research projects; developing, analyzing, and technically evaluating medical records; developing auxiliary records (such as indexes of physicians, diseases treated, and operations performed); compiling statistics, especially those pertaining to services given patients; coordinating institution records and reports; preserving medical records; maintaining an educational and training program for professional, technical, and clerical staffs; and managing the medical record department.

The number and kind of duties medical record librarians perform may vary markedly, depending on the size and type of institution where employed.

The chief medical record librarian, whose staff consists of other medical record librarians, medical record technicians, and clerical workers, directs the activities of the entire medical record department. She usually represents her department at hospital staff meetings and may testify in court actions that involve medical records. Some medical record librarians have unique administrative and research positions, and a few are employed as consultants.

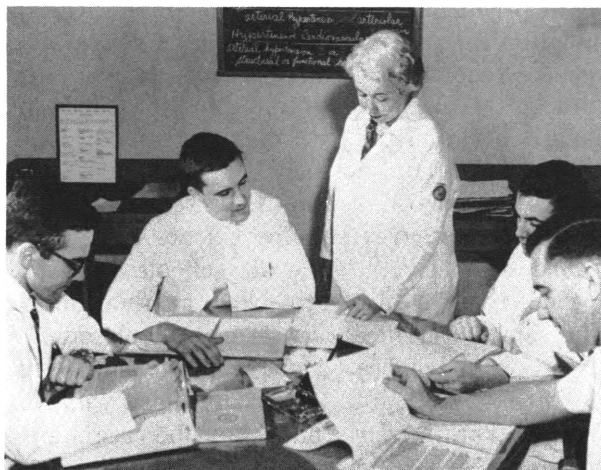
The records maintained by the medical record librarian contain medical and surgical information on each patient, including history of the illness, physical examination findings, doctors' orders and progress notes, nurses' notes,

and reports on X-rays and laboratory findings. These records are used for research, insurance claims, legal actions, evaluation of treatment and medications, and for training medical, nursing, and related personnel. Medical information found in hospital records is also important in planning community health programs.

The occupation of medical record librarian should not be confused with that of medical librarian, whose work is chiefly confined to books, periodicals, and other publications.

**Where Employed**

Most medical record librarians are employed in hospitals. Others work in clinics, medical research centers, medical departments of insurance companies and industrial establishments, health agencies, local and State health departments, regional hospital councils, and student health centers. Since most hospitals



Courtesy of U.S. Veterans Administration

*Medical record librarian orienting new doctors in the preparation of medical records.*

\* Prepared by the Women's Bureau, U.S. Department of Labor.

are located in or near large cities, virtually all medical record librarians work in these population centers.

More than 24,500 medical record personnel were employed in 6,845 private and government hospitals in 1959, according to the American Hospital Association. Nearly 2,550 of these workers were registered medical record librarians, about 300 were accredited medical record technicians, and the remainder were clerks, unaccredited technicians, and nonregistered record librarians. In 1958, about three-fourths of these persons were working in general hospitals, and the remainder were in specialty hospitals providing care for patients with mental diseases, tuberculosis, orthopedic conditions, and other long-term illnesses.

At the present time, almost all medical record librarians are women, but the number of men in the field is growing.

#### **Training, Other Qualifications, and Advancement**

The minimum requirement for professional registration is 2 years of general college work and 1 year of study in medical record science. The trend is toward higher educational requirements—a bachelor's degree in medical record science or a bachelor's degree supplemented by a 1-year postgraduate course in medical record science.

Twenty-nine schools, located in 20 States and Puerto Rico, were approved by the Council on Medical Education and Hospitals of the American Medical Association (AMA) for training medical record librarians in 1960. Most of the schools were college-affiliated. Two-thirds of the schools admitted both men and women; one-third admitted only women.

Curriculums offered at these schools lead to a bachelor's degree or a certificate in medical record science. In general, schools granting degrees require only high school graduation for admission. Certificate-granting schools offer a 12-month concentrated course and usually require that applicants have 2 or more years of college training or that they be registered nurses. A few schools require an applicant to have a college degree before entering the medical record science program. The trend is toward higher educational standards which will require

a bachelor's degree in medical record science or a bachelor's degree supplemented by a 1-year graduate course in the field.

To be approved by the AMA, each educational program for medical record librarians must provide at least 50 weeks of theoretical instruction and practical experience. The curriculum must include courses in anatomy and physiology; fundamentals of medical science; medical terminology; medical record science; organization and administration; interdepartmental relations; and legal aspects pertaining to medical records, ethics, and statistics. Practical experience involves hospital admitting and discharging procedures; standard indexing and coding practices; and knowledge of the work of such adjunct departments as X-ray, pathology, medical library, outpatient, and social service.

Graduates of approved schools in medical record science are eligible to take the national examination of the American Association of Medical Record Librarians, which is given annually. Candidates who pass this examination receive a certificate of registration which entitles them to professional recognition as Registered Record Librarians (RRL).

At the present time, no graduate work is offered in medical record science, but some medical record librarians do graduate work in the field of health education.

Formal training at the *technician* level was introduced about 8 years ago to meet the critical demand for personnel who can assume some of the technical medical record work requiring less responsibility. For high school graduates unable to spend 3 or 4 additional years in school, technician training offers an opportunity to enter the less demanding positions.

Approved technician training courses are offered in 12 schools and last from 9 to 12 months. In 7 of the 12 schools, men are admitted as well as women. Theoretical instruction, which may be presented through formal lectures or informal conferences, includes anatomy, medical terminology, and the use and care of medical records. Most of the training is practical in nature and includes admitting procedures, discharge procedures, and secretarial practice. On completion of the technician



course, students may take an examination given by the American Association of Medical Record Librarians. Candidates who pass the examination are recognized as Accredited Record Technicians (ART).

Certain personal characteristics are deemed highly desirable in the achievement of a successful and satisfying career in this profession. Applicants must be accurate and meticulous, be interested in detail, and have a willingness to be persistent in obtaining data. Because medical record information is of a confidential nature, personnel must be especially discreet in processing and releasing it. Since the work is exacting and yet subject to frequent interruptions, the medical record librarian should be able to maintain standards of accuracy despite pressures. Medical record librarians, especially those in administrative positions, must be able to work with other members of the medical team—physicians, surgeons, nurses, heads of other departments, other hospital personnel—and the general public.

Medical record librarians may advance by being assigned to supervisory positions. A medical record librarian may be appointed as chief of a single department or as the coordinator of medical record departments of several hospitals.

### Employment Outlook

Opportunities for qualified medical record librarians are expected to be excellent during the 1960's. Currently, the demand is great and the number of unfilled job openings is increasing, partly because of growth in the number of hospitals and in the volume and complexity of hospital records. In addition to the need for professional record personnel, there is a growing demand for persons at the technician level. Persons are needed in both general and special hospitals. There is also an increasing need for record personnel to engage in specialized fields of research and to assume administrative and training responsibilities. The field is open to both men and women.

The importance of medical records is growing rapidly owing in part to increased demands for clinical data to be used in research on the many killing and crippling diseases and on

the use of new drugs and other methods of treatment. Special interest in the aging population will necessitate the recording and periodic summarizing of the conditions of persons in nursing homes and in home care programs.

Consultants and group supervisors are needed to provide services for standardization of records in areas where medical record librarians are not available. Positions are available in military hospitals in the United States and overseas, as well as in other government agencies and private industry.

In 1959, 143 persons graduated from approved courses in medical record science. At the same time, 180 students were enrolled in the senior class of degree programs or in certificate programs. Enrollment in these programs has been rising in recent years, but classes still are not filled to capacity.

Despite the increase in the number of newly trained medical record librarians, the shortage was so great that many hospitals were unable to hire registered personnel. The American Association of Medical Record Librarians estimated in 1960 that 3,000–4,000 more registered medical record librarians and 10,000–15,000 additional medical record personnel, including technical and clerical workers, were needed.

### Earnings and Working Conditions

Salaries of medical record librarians are influenced by the geographic location, size, and type of employing agency, as well as by the nature of duties and responsibility of the position held. Average weekly salaries of these workers ranged from \$80 to \$112, according to a survey of hospital employees in 15 metropolitan areas in mid-1960.

The average (mean) salary for chief medical record librarians (registered) in 1960 was estimated by the American Association of Medical Record Librarians to be \$5,200 a year. Persons with a degree from an approved school averaged about \$300 more a year than graduates of schools which did not offer degrees in medical record science. The average annual salary for accredited medical record technicians was \$3,750.

Yearly salary scales established for per-

sons entering Federal employment ranged in 1960 from \$4,345 to \$8,955, depending upon the amount and type of education and experience. The average Federal salary for record librarians in 1959 was \$5,857.

Medical record librarians usually work the hours scheduled for other professional and technical workers in the same place of employment. In the 15 areas surveyed, a 40-hour workweek was most common. Vacations with pay, of at least 2 weeks' duration, were usual after a year of service, and longer vacations for persons with longer service. The number of paid holidays ranged from 5 to 13.

Working conditions are generally pleasant, although increasing complexity of the work of medical record departments and the growing accumulation of records have resulted in crowded conditions in some hospitals.

#### **Where To Go for More Information**

Information about approved schools and employment opportunities may be obtained from:

The American Association of Medical Record Librarians,  
840 North Lake Shore Dr., Chicago 11, Ill.

# ENGINEERING

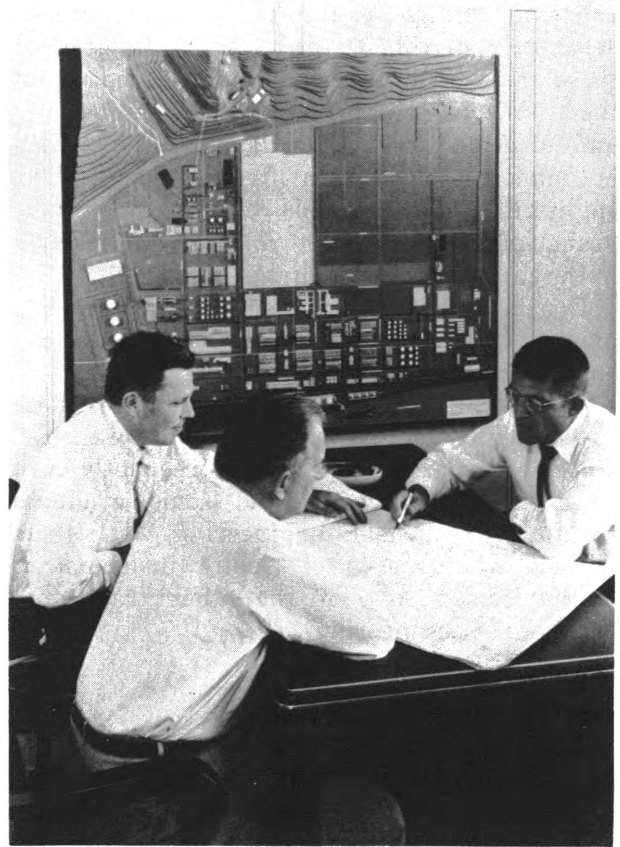
Engineering, the second largest professional occupation, is exceeded in size only by teaching; for men, it is the largest profession. The approximately 875,000 engineers in the United States in mid-1960 have made major contributions to the design, construction, and efficient utilization of the machines, equipment, roads, and buildings used by the Nation's 180 million people. Engineers provide technical and, frequently, managerial leadership in industry and government. They develop new products and processes, design many types of machines and structures, and contribute in countless other ways to the technological progress of the country and to the national defense.

## Nature of Work

Engineers work out the most efficient ways of transforming metals and other raw materials into things people can use and of harnessing waterpower, nuclear energy, and other sources of power. This emphasis on efficiency, which is closely related to cost, is one of the main factors which distinguishes the work of most engineers from that of most scientists. A chemist may create a new compound or a biologist may discover a new vaccine. The engineer must determine how the compound or the vaccine can be manufactured efficiently and profitably. In constructing a large building, for example, an engineer must calculate just how much weight the walls will have to bear, what other forces will affect them, and what margin of safety must be allowed. The engineer has to decide which construction materials would be the best to use, taking into consideration their relative strengths and durability, their cost, the quantities needed, and the cost of their installation and upkeep. Similar factors must be considered by engineers who develop and design a wide variety of products

such as washing machines, electronic computers, guided missiles, and industrial machinery.

Besides developing and designing new and improved products, engineers are engaged in a number of other kinds of activities. Many are in administrative and management positions, particularly in industries such as aircraft and missiles and electronics manufacturing where engineering methods are of great importance. Many supervise construction activities or the operation of plants and mines. Others do research, aimed at providing the information needed for the development of new products or manufacturing processes. Some, particularly



*Engineers studying construction proposal for new plant.*

trainees or beginning engineers, do drafting, analysis, or testing, much of which is routine work. Others with considerable experience work as independent consultants or for consulting firms, advising clients on engineering matters. Many engineers are employed in sales positions, where they must be able to discuss the technical aspects of a product or assist in planning its installation and use. A relatively small but exceedingly important group of engineers teach in colleges, universities, or engineering schools.

Most engineers eventually specialize in one of the many branches of the profession, although there is a trend away from specialization in the early phases of training and career development. More than 25 specialties are recognized by the profession or in engineering school curriculums. Several of these—aeronautical, agricultural, ceramic, chemical, civil, electrical, industrial, mechanical, metallurgical, and mining engineering—are discussed separately in this chapter. Work in each of these areas involves specialized knowledge, but there is a considerable body of basic engineering and scientific knowledge and methodology which is common to most areas of engineering. Thus, engineers are often able to shift from one branch of the profession to another, particularly in the early stages of their careers.

Engineers may also become specialists in a particular field of technology, such as nuclear engineering, or in the engineering problems of a particular industry. In many instances these specialties cut across the traditional branches. Nuclear engineers, for example, frequently have considerable experience and some graduate training in nuclear engineering, but their bachelor's degrees are usually in chemical, mechanical, or one of the other traditional branches of engineering.

### Where Employed

The large majority of engineers—nearly three-fourths of the total number in 1960—are employed in private industry. Virtually all manufacturing industries employ some engineers. Those employing the largest numbers are the aircraft and parts, electrical equipment,

and machinery industries. Other industries which employ sizable numbers of engineers include construction, chemicals and allied products, transportation and other public utilities (including electric light and power and communications companies), fabricated metal products, petroleum, and primary metals.

Another large group of engineers—more than 10 percent of the 1960 total—are employed by Federal, State, and local government agencies. Most of the engineers employed by the Federal Government work for the Departments of Defense, the Interior, Commerce, and Agriculture, and the National Aeronautics and Space Administration. Most of those in State government service are employed by highway and public works departments.

Other major areas of employment for engineers are engineering and architectural services (including consultants), the Armed Forces (active duty), and educational institutions. The remainder are in a variety of other types of employment, including independent commercial laboratories and nonprofit organizations.

Engineers are employed in every State, in small cities as well as large. The profession also offers opportunities for employment overseas. However, some branches of engineering are concentrated in particular geographic areas or industries (as indicated in the statements on these branches later in this chapter).

### Training and Other Qualifications

A bachelor's degree in engineering is usually the minimum educational requirement for young people seeking careers as engineers. Some engineers, however, have entered the profession with training in physics or one of the other natural sciences, or mathematics. Others have been able to enter the field without a degree, but only after long experience as semi-professional workers—such as draftsmen and engineering technicians—and some college-level training. The proportion of engineers with advanced degrees is still small in most branches of the profession, but graduate training is being emphasized in the selection of personnel for an ever-increasing number of jobs. Further-

more, training in some engineering specialties, such as nuclear engineering, is available chiefly at the graduate level.

Training in engineering leading to a bachelor's or higher degree was offered in 1960 by 238 universities and engineering schools. Of these, 158 had one or more curriculums which were accredited by the Engineers Council for Professional Development. Although admission requirements vary considerably, most engineering schools require courses in mathematics (often through trigonometry and college algebra) and the physical sciences, and place great emphasis on the general quality of the applicant's high school work.

In the typical 4-year engineering curriculum, the first 2 years are spent mainly in studying preengineering subjects such as mathematics, chemistry, and physics, and taking courses in the liberal arts—the humanities, social sciences, and English. The last 2 years are devoted chiefly to engineering and advanced mathematics and science courses, with some differences in courses depending on the branch of engineering in which the student is specializing.

Some engineering curriculums require more than 4 years to complete. A number of institutions have 5-year programs leading to the bachelor's degree. Other engineering schools have arrangements with liberal arts colleges whereby a student spends 3 years in the college and 2 years in the engineering school and receives a bachelor's degree from each. About 50 institutions have cooperative plans, under which students spend alternate periods in engineering school and in employment in industry or government. Under most such plans, the normal 4-year curriculum is spread over 5 and sometimes 6 years, but the graduate has the advantage of about 2 years of experience in addition to his engineering degree.

Recent developments in science and engineering have made a good background in mathematics and the physical sciences especially important for the prospective engineer. Young people considering an engineering career should therefore obtain extensive training in these subjects in college. A broad education which includes courses in the social sciences and human-

ities is also valuable in many engineering positions.

Engineering graduates usually begin work as trainees or in the more routine jobs. Some companies have special training programs for their beginning engineers. These programs are designed to acquaint new graduates with specific industrial techniques and to aid in determining the type of work for which the individual is best suited. As they gain experience, engineers frequently move up to positions of greater responsibility. Those with ability and interest can advance to high-level technical, supervisory, and administrative jobs and to top executive positions.

Laws providing for licensing (or registration) of professional engineers whose work may affect life, health, or property are in effect in all 50 States and the District of Columbia. In 1960, about 240,000 engineers were registered under these laws in the United States. Generally, requirements for registration as a professional engineer are: graduation from an accredited curriculum of an engineering college plus at least 4 years of experience and passing of a State examination. Examining boards may accept a longer period of experience as a substitute for a college degree.

### Employment Outlook

The outlook is for continued rapid expansion of the engineering profession, both through the mid-1960's, and over the long run. Engineering has been one of the fastest growing professional occupations in the United States in the past 50 years, and there is every indication that the demand for engineers will continue to grow. As in recent years, there will probably be a particular need for engineers with advanced degrees to teach and to do research.

Some of the major factors expected to raise the demand for engineering personnel are: Continued high levels of Government spending for defense, accentuated by the increasingly large amount of engineering time necessary for the development of modern weapons; growth of population and expansion of industry; increasing complexity of industrial technology, as such the trend toward automation of in-

dustrial manufacturing processes; and further growth in expenditures for research and development. In particular, the large sums spent for research and development in recent years by both industry and Government—total research and development expenditures in the United States amounted to more than \$13 billion in 1960–61—have broadened existing areas of employment for engineers and opened up new ones, such as those concerned with computers, missiles, and nuclear energy. As scientific frontiers are extended, more areas of work for engineers will be provided. In addition, the rise in engineering enrollments anticipated during the middle and late 1960's will result in additional openings in college and university teaching. (See statement on College and University Teachers.)

Besides the engineers needed to fill new positions, thousands more will have to be trained annually to replace those who transfer to other occupations, retire, or die. Losses to the profession from retirements and deaths alone were estimated to be more than 10,000 in 1960 and were expected to rise in the future.

Despite the anticipated growth in demand for engineers, little or no increase in the annual number of engineering graduates is expected until the mid-1960's. Thus, employment prospects for engineering graduates should continue to be very favorable through the mid-1960's, at least. For engineering graduates with ability and thorough training, there is every reason to believe that employment opportunities will remain very good for many years to come.

Women engineers, who represent only an extremely small proportion of the profession, are expected to have favorable employment opportunities through the mid-1960's. Furthermore, there are some indications that employers are eliminating salary and other employment differences between men and women engineers of comparable education and experience who are doing similar work.

The preceding analysis relates to the outlook for the engineering profession as a whole. The employment outlook in various branches of engineering is discussed in the statements on these branches later in this chapter.

## Earnings

The average (median) yearly salaries of engineering graduates with bachelor's degrees and no experience are shown in the following tabulation, based on a survey made by Engineering Manpower Commission in mid-1960.

<i>Industry</i>	<i>Median</i> <sup>1</sup>	<i>Upper decile</i> <sup>2</sup>	<i>Lower decile</i> <sup>3</sup>
Aircraft and parts .....	\$6,450	\$7,450	\$5,875
Chemical .....	6,325	6,950	6,000
Construction .....	6,200	6,900	5,600
Electrical machinery and electronics .....	6,575	7,250	6,025
Machinery manufacturing (except electrical) .....	6,300	6,900	5,775
Petroleum .....	6,250	6,825	5,675
Telecommunications (operations) .....	6,125	6,500	5,575
Utilities (electric and gas) .....	6,150	6,475	5,600
Miscellaneous services:			
Consulting services .....	6,250	7,250	5,425
Research and development activities .....	6,825	7,850	6,125
Government:			
State highway commissions .....	5,900	6,775	5,150

<sup>1</sup> 50 percent earned more and 50 percent earned less than amounts shown.

<sup>2</sup> 10 percent earned more than amounts shown.

<sup>3</sup> 90 percent earned more than amounts shown.

Engineering graduates with master's degrees and no experience usually received between \$800 and \$1,400 a year more than those with only bachelor's degrees. Salaries for beginning graduates with doctor's degrees were typically between \$9,000 and \$11,000 a year.

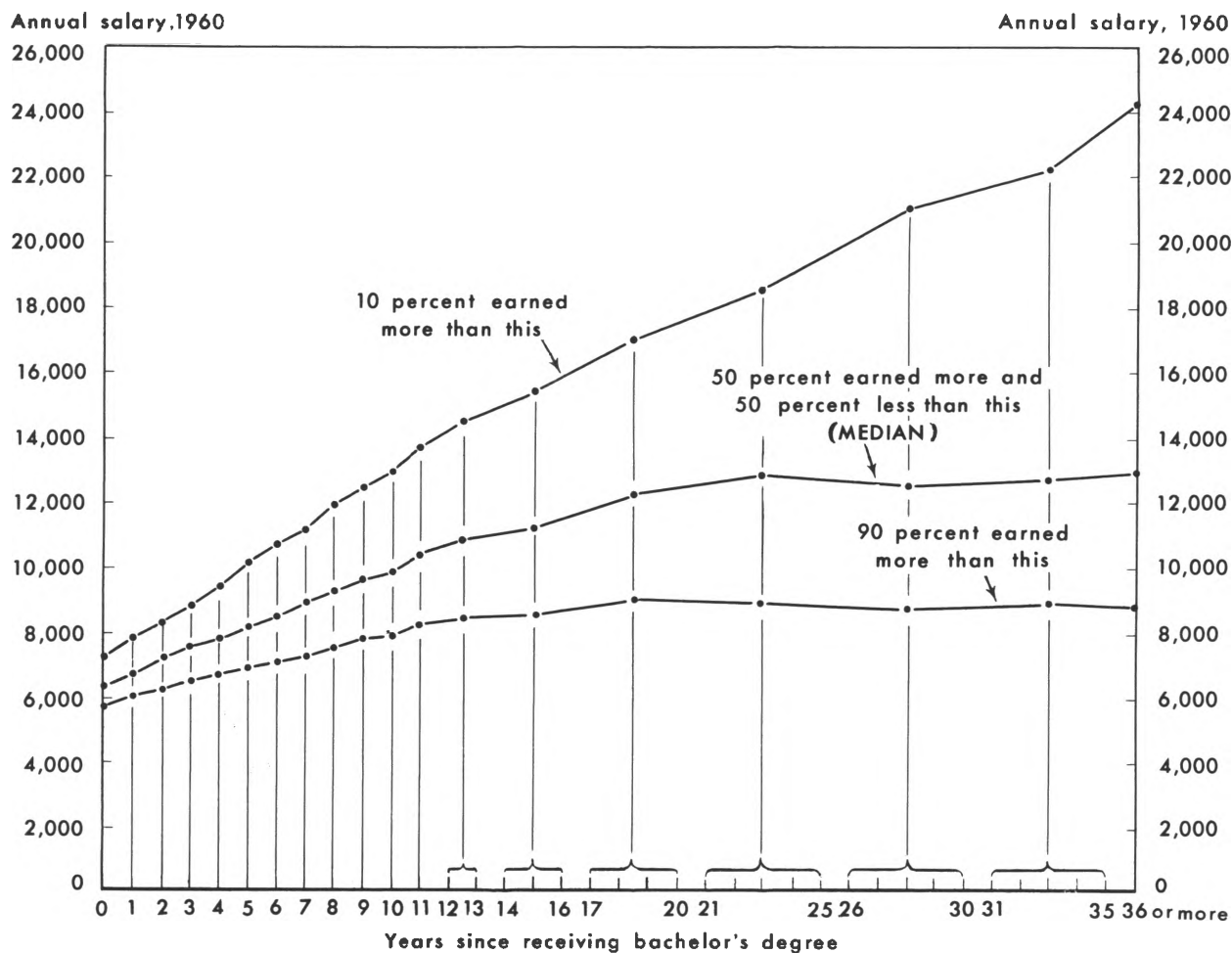
In the Federal Government in 1960, the beginning salary for engineers with the bachelor's degree and no experience was either \$5,335 or \$6,345 a year, depending on the individual's college record. Beginning engineers with 1 full year of graduate study could begin at \$6,345; those with 2 full years at \$6,435. New graduates with the doctorate were eligible to begin at \$7,560 or \$8,955.

Most engineers can look forward to a marked increase in earnings as they gain experience. Thus, in industry the median annual salary of engineers with 10 years of experience was about \$10,000 in 1960, and that of engineers with 20 years of experience was about \$12,400 (chart 17). Nearly all (90 percent) of those with 20 years of experience had earnings of at least

CHART 17

## EARNINGS OF ENGINEERS INCREASE WITH EXPERIENCE.....

Salaries of Engineering Graduates Employed in Industry



Source: Engineers Joint Council, Professional Income of Engineers, 1960.

\$9,000 a year and a few (10 percent) earned \$17,600 or more. A small number in top-level executive positions had much higher earnings.

In general, earnings of engineers are somewhat higher in private industry than in other types of employment. Though engineers in government employment generally earn less than those in private industry, particularly in top-level jobs, their salaries tend to be somewhat higher than those of engineering teachers. On the other hand, engineers in educational institutions frequently supplement their salaries

with income from special research projects, consulting work, and writing for publications.

#### Where To Go for More Information

General information on engineering careers—including student selection and guidance, professional training and ethics, salaries and other economic aspects of engineering—may be obtained from:

Engineers' Council for Professional Development,  
29 West 39th St., New York 18, N.Y.

Engineers Joint Council,  
29 West 39th St., New York 18, N.Y.

National Society of Professional Engineers,  
2029 K St. N.W., Washington 6, D.C.

Information on engineering schools and curriculums and on training and other qualifications needed for entrance into the profession may also be obtained from the Engineers' Council for Professional Development. Information on registration of engineers may be obtained from the National Society of Professional Engineers.

Organizations which can furnish information on the respective branches of engineering are listed below :

American Ceramic Society,  
4055 North High St., Columbus 14, Ohio

American Institute of Chemical Engineers,  
25 West 45th St., New York 36, N.Y.

American Institute of Electrical Engineers,  
33 West 39th St., New York 18, N.Y.

American Institute of Industrial Engineers,  
145 North High St., Columbus 15, Ohio

American Institute of Mining, Metallurgical  
and Petroleum Engineers,  
29 West 39th St., New York 18, N.Y.

American Society of Civil Engineers,  
33 West 39th St., New York 18, N.Y.

The American Society of Mechanical Engineers,  
29 West 39th St., New York 18, N.Y.

Institute of the Aerospace Sciences, Inc.,  
2 East 64th St., New York 21, N.Y.

The above list does not include all of the many engineering organizations. Other engineering organizations are listed in the following publications available in most libraries :

Engineering Societies Directory, 1959, published by  
Engineers Joint Council.

Scientific and Technical Societies of the United  
States and Canada, published by the National  
Academy of Sciences, National Research Council.

Some engineers are members of labor unions. Information on engineering unions may be obtained from :

The American Federation of Technical Engineers  
(AFL-CIO),  
900 F St. NW., Washington 4, D.C.

The U.S. Civil Service Commission, Washington 25, D.C. will furnish information on positions available in Federal Government agencies. For further information see chapter on Occupations in Government.

## Aeronautical Engineers

(D.O.T. 0-19.03)

### Nature of Work

Aeronautical engineers have played a vital role in America's entry into the space age. Engineers in this specialty work on all types of missiles and spacecraft, as well as conventional aircraft. They may work in any phase of missile or aircraft development, from the initial planning to the final design, testing, and manufacture.

Aeronautical engineers usually specialize in some particular area of work, such as structural design, instrumentation, propulsion systems, fuels, or production methods. They may also specialize in a particular type of aircraft, such as conventional propeller-driven planes or jet-powered aircraft, or in spacecraft or missiles.



Courtesy of National Aeronautics and Space Administration

*Engineer checking out payload of communications  
satellite before launching.*



### Where Employed

Most aeronautical engineers are employed by the aircraft and missiles industries, sometimes called the aerospace industry. Some work for Federal Government agencies, principally the Department of Defense and the National Aeronautics and Space Administration. Small numbers work for commercial airlines, colleges and universities, and other employers.

### Employment Outlook

The outlook is for continued expansion of employment in aeronautical engineering, both in the near future and over the long run. Employment will grow as a result largely of continued increases in Government expenditures

for missiles and spacecraft. In recent years, the focus of aeronautical engineering work has shifted from propeller-driven and jet-powered aircraft to missiles and rockets, and this emphasis on space vehicles is expected to grow. Moreover, the increasing complexity of missiles and spacecraft, which require more and more engineering time to design and build, will further increase the demand for these engineers. Research aimed at developing new aircraft and improving those now in use will probably also require additional engineers. (See introductory section of this chapter for discussion on training and other qualifications, earnings, and where to go for more information. See also chapter on Occupations in Aircraft, Missile, and Spacecraft Manufacturing.)

## Agricultural Engineers \*

(D.O.T. 0-19.10)

### Nature of Work

Agricultural engineers develop equipment and methods to make farmwork easier, more productive, and more economical. The efforts of agricultural engineers are directed largely to the design of tractors and other farm equipment and farm structures; utilization of electrical energy on farms; soil and water conservation and management; and processing of agricultural products for the market. They use basic engineering principles and concepts to help achieve greater production per farmworker with fewer man-hours per unit of produce, at a greater yield to the farmer and improved quality for the consumer. Specific areas of work include research, education, production, design, development, testing and application, production engineering, sales engineering, maintenance, management, or some combination of these.

### Where Employed

Private industry employs approximately 60 percent of the agricultural engineers in the

United States and the rest are engaged in governmental and other service activities.

Agricultural engineers are employed by more than 1,000 private business organizations, ranging from very large manufacturers to individually owned small businesses. These include farm-equipment manufacturers who produce tractors and related farm equipment; smaller companies manufacturing more specialized lines of field, barnyard, and household equipment; producers of electrical, mechanical, and structural component parts and basic component materials having agricultural applications; electric service companies; distributors and dealers in farm equipment and supplies; trade associations; specialized agricultural producers and processors; publishers; advertising agencies; consulting engineers; and engineering and management services for farmers. Some agricultural engineers are self-employed as owners or partners in some of the above types of business.

The U.S. Department of Agriculture—principally the Department's Soil Conservation Service and Agricultural Research Service—is the largest Federal Government employer of agricultural engineers. The Departments of the Interior and Defense employ smaller numbers, and several other Federal agencies each em-

\* Prepared by the U.S. Department of Agriculture.

ploy a few. Individual State Governments also employ agricultural engineers, most of whom are affiliated with the agricultural engineering departments of the State colleges, universities, experiment stations, and extension services. Some are employed by other State agencies concerned with natural resources, food sanitation, pollution control, highways, soil conservation, and other work related to State interests in public welfare, business, and agriculture. A few agricultural engineers work for counties, cities, and special districts organized to carry on activities connected with drainage, irrigation, public power, and soil conservation.

### Employment Outlook

The employment outlook for agricultural engineers is expected to be favorable, both through the mid-1960's and over the long run. Several factors contribute to the favorable out-

look. The market for agricultural products will increase with the increase in population. Broadening use of agricultural products and wastes as industrial raw material will create new openings for agricultural engineers. These engineers have already proved their worth in agriculture, especially in improving man's capacity to deal effectively and economically with the problems that are characteristic of the modern farm—high tonnages, large volumes, and enormous energy and power requirements. However, these major factors in the cost and quality of agricultural production are open to much further improvement through agricultural engineering. They present major opportunities for additional engineering service to agriculture. (See introductory section of this chapter for discussion of training and other qualifications, earnings, and where to go for more information. See also chapter on Agricultural Occupations.)

## Ceramic Engineers

(D.O.T. 0-15.11)

### Nature of Work

Ceramic engineers are concerned with the processing of clay and other nonmetallic minerals, and with their manufacture into a wide variety of ceramic products, ranging from cement and bricks to dentures, and coatings for missile nose cones. They may also design and supervise the construction of the plant and equipment used in the manufacture of these products. Many ceramic engineers are engaged in research and development work. Others are employed in administration and management, plant operations, selling, and teaching. A few do consulting work.

Ceramic engineers usually specialize in one or more products—for example, products of refractories (fire- and heat-resistant materials, such as firebrick); whiteware (such as porcelain and china dinnerware or high voltage electrical insulators); structural materials (such as brick, tile, and terra cotta); protective and refractory coatings for metals; glass; and abrasives.

### Where Employed

Most engineers in this branch are employed in manufacturing industries. The largest numbers are in the stone, clay, and glass industries, but others work in the iron and steel, electrical equipment, chemicals, and other industries which produce or use ceramic products. Some are employed by educational institutions and by other organizations. A small number work for government agencies, chiefly the Federal Government.

### Employment Outlook

The outlook is for rapid growth in employment of ceramic engineers, both through the mid-1960's and over the long run. Ceramic engineering is one of the smaller branches of the profession, however, and opportunities for new entrants in any one year will be few, compared with those in some of the other branches of engineering.

Newer areas of work in nuclear energy, electronics, and rocket propulsion will provide

many of the opportunities for these engineers. Ceramic-coated metals which are corrosion-resistant and capable of withstanding both radiation and extremely high temperatures are becoming increasingly important in the development of nuclear reactors and rockets. Increasing use of the more traditional ceramic products, such as whiteware and abrasives, will also require additional ceramic engineers for research

and design work, both to improve these products and to adapt them to new requirements. The growing use of cement and structural-clay products in construction will also add to the opportunities for ceramic engineers. (See introductory section of this chapter for discussion on training and other qualifications, earnings, and where to go for more information.)

## Chemical Engineers

(D.O.T. 0-15.01)

### Nature of Work

Chemical engineers transform the discoveries made in chemical laboratories into large scale production. They are primarily concerned with designing and operating the chemical plants and equipment and with the other engineering work required to produce chemicals in large quantities. A chemical process may consist of a combination of "unit operations"—mixing, crushing, grinding, crystallization, heat transfer, distillation and drying—and chemical operations—oxidation, hydrogenation, chlorination, and polymerization. The chemical engineer determines the combination of these operations which will result in the most effective manufacturing process.

Because of the great complexity of this work, the chemical engineer frequently becomes a specialist in a particular type of operation, such as heat transfer, distillation, or drying, or in the products of one industry, such as petroleum, plastics, rubber, food, or industrial chemicals. The activities in which chemical engineers are chiefly engaged are research and development, plant operation, design, and management.

### Where Employed

A great many industries employ chemical engineers. However, most of them work for manufacturing firms—chiefly in the chemicals and petroleum industries. Some are employed by government agencies, colleges and univer-

sities, and consulting firms, or as independent consulting engineers.

### Employment Outlook

Chemical engineering is one of the youngest and most rapidly growing of the major branches of engineering. The outlook is for continued growth in this branch of engineering, both through the mid-1960's and over the long run.

The major factors which have contributed to the growth in past years—expansion of industry and increases in research and development activities—will in all probability continue to be important in the future. In particular, continued expansion of research and development activity (in which about one-third of all chemical engineers are employed) is expected to contribute to further growth of employment in the profession.

The increasing complexity of chemical processes and the growing trend toward automation of these processes, particularly in the chemicals and petroleum industries, will require additional chemical engineers to design, build, and maintain the necessary plants and equipment. Chemical engineers will also be needed in many relatively new areas of work, such as nuclear energy and rocket fuels. (See introductory section of this chapter for discussion on training and other qualifications, earnings, and where to go for more information. See also statement on Chemists and chapter on Occupations in the Industrial Chemicals Industry.)

## Civil Engineers

(D.O.T. 0-16.01)

### Nature of Work

Civil engineering is the oldest and one of the largest branches of the engineering profession. Civil engineers design and supervise the construction of roads, harbors, airfields, dams, tunnels, watersupply and sewage systems, transportation facilities, buildings, and many other types of structures. This branch of the profession is so broad that many specialties have developed within the field; the major specialties are structural, highway, hydraulic, railroad, and sanitary engineering.

A sizable number of civil engineers are in supervisory or administrative positions, ranging from that of site supervisor of a construction gang or head of a drafting department to top-level executive posts. Many are also employed in design and related activities.

### Where Employed

The great majority of civil engineers are employed by Federal, State, and local government agencies and the construction industry. In addition, many are employed by consulting en-

gineering and architectural firms or work as independent consulting engineers. Others are employed by public utilities, railroads, and by educational institutions. Still others are employed in the iron and steel industries and other branches of manufacturing.

Civil engineers work in all parts of the country, in every State and city. The largest numbers work in or near the industrial and commercial centers. However, since civil engineers are frequently called upon to work at construction sites, they are sometimes stationed in remote areas of the United States or in foreign countries. Furthermore, although many positions involve little or no travel, civil engineers in some positions are often required to move from place to place to work on different projects.

### Employment Outlook

Employment in civil engineering is expected to grow, both in the near future and over the long run, although not as rapidly as in electrical and mechanical engineering, the other large branches of the profession. Construction activity, including housing, industrial building, and highway construction, is expected to increase for many years. New programs in areas related to water and sewage systems, flood control, air and water pollution, and reclamation are likely to be introduced during the next decade, and these programs will require additional civil engineers.

Large numbers of civil engineers will also be needed each year to replace those leaving the field. Civil engineers as a group are older than engineers in other specialties and the proportion of them lost to the profession each year by retirement or death is therefore relatively high. The number of civil engineers needed to fill vacancies thus created was about 2,800 during 1960 and will probably rise slowly in the future. (See introductory section of this chapter for discussion on training and other qualifications, earnings, and where to go for more information.)



Courtesy of U.S. Bureau of Reclamation

*Civil engineer inspecting reinforcing steel used in a river basin project.*

## Electrical Engineers

(D.O.T. 0-17.01 and .02)

### Nature of Work

Electrical engineering has been among the most rapidly growing branches of the profession in recent years. This branch of the profession, which includes engineers specializing in electronics, is today one of the three largest branches of engineering. Electrical engineers are concerned with the generation of electricity and its transmission and use. They may design, develop, and supervise the manufacture of electrical and electronic equipment—including electric motors and generators; communications equipment; electronic apparatus such as television, radar, computers, and missile guidance systems; and electrical appliances of all kinds. They may also participate in the design and operation of facilities for generating and distributing electric power.

The major areas of work in this branch of engineering include electronics, electrical machinery and equipment manufacturing, telephone and telegraph, power, illumination, and transportation. Electrical engineers usually specialize in one of these broad areas of work or even in a subdivision of some one area. Electronic engineering, for example, is increasingly becoming recognized as a distinct branch of the profession.

A large number of electrical engineers are engaged in design, development, and research. Another large group are employed in technical administration. Others are employed in manufacturing operations or in technical sales.

### Where Employed

Electrical engineers are chiefly employed by electrical and electronic equipment manufacturers, and by electric light and power, aircraft and missile, telephone and telegraph, and radio and television broadcasting companies. However, many members of this profession are employed in still other industries, and some are employed by government agencies, colleges and

universities, and consulting firms. A few work as independent consulting engineers.

Employment in this branch of the profession is concentrated to a considerable extent in the industrial centers where electrical and electronic equipment is manufactured. However, jobs with electric light and power companies, telephone companies, and radio and television stations are located in every State—in small towns as well as large cities.

### Employment Outlook

The outlook is for rapid growth of employment in this branch of the engineering profession, both in the near future and over the long run. Military needs for new and improved types of electronic and electrical equipment have been, and are expected to remain, a major factor in increasing the demand for electrical engineers. These defense needs, added to those of the civilian economy, are expected to result in a continued rapid growth in the electrical and electronics equipment industry. The electric utility and the telephone and telegraph industries—other large fields of employment for electrical engineers—are also expected to grow. Newer areas of work such as nuclear energy, missile guidance systems, servomechanisms, computers, and automation will probably continue to require large numbers of electrical engineers as well as other engineers and scientists.

Besides those needed to fill new positions, a sizable number of electrical engineers will be required to replace personnel lost to the profession by retirement or death. The number needed to fill such vacancies was estimated to be about 2,000 in 1960, and will probably rise slowly in the future. (See introductory section of this chapter for discussion on training and other qualifications, earnings, and where to go for more information. See also chapter on Electronics Manufacturing Occupations.)

## Industrial Engineers

(D.O.T. 0-18.01)

### Nature of Work

Industrial engineers are primarily concerned with the efficient use of machines, materials, and personnel. They often specialize in planning plant layouts so that the work will flow efficiently from one production process to the next, or in the selection and design of machines and equipment to be used in manufacturing operations. They are also concerned with the installation of automated manufacturing processes. Among their numerous other specialties are time, motion, and incentive studies; production methods and standards; cost control and records; quality control; and safety engineering.

### Where Employed

A large proportion of all industrial engineers are employed in manufacturing industries. Others work in the construction and mining industries, for utilities, and for the Federal Government. A few are employed by banks,

mail-order houses, life-insurance companies, and other large business organizations to improve the efficiency of clerical and other operations.

### Employment Outlook

Employment of industrial engineers is expected to grow, both in the near future and over the long run. The increasing complexity of industrial operations and the expansion of automated processes, coupled with the continued growth of the Nation's industries, are expected to increase the demand for personnel trained in this branch of engineering. Growing recognition of the importance of scientific management and safety engineering and of the contribution of industrial engineers in reducing costs and increasing productivity is expected to stimulate further the demand for personnel in this branch of engineering. (See introductory section of this chapter for discussion on training and other qualifications, earnings, and where to go for more information.)

## Mechanical Engineers

(D.O.T. 0-19.01, .05, .81, .91)

### Nature of Work

Mechanical engineering is one of the three largest branches of the profession, along with civil and electrical engineering. If aeronautical and industrial engineering, which are offshoots of mechanical engineering were included, it would represent by far the largest branch of the profession.

Mechanical engineers deal primarily with machines, power, and heat. They design and develop machines, such as internal combustion engines, steam turbines, jet and rocket engines, and nuclear reactors, which produce power from fuels and other sources. They also develop and design a great variety of machines and devices which use power—refrigerating and air conditioning equipment, elevators, machine

tools, printing presses, steel rolling mills, and many others. Mechanical engineers often supervise the installation, operations, and maintenance of industrial machinery.

Many specialized areas of work have developed within mechanical engineering. Among these are motor vehicles, marine equipment, railroad equipment, rockets, steam power, heating, ventilating and air conditioning, hydraulics or fluid mechanics, instrumentation, ordnance, and machines for specialized industries, such as petroleum, rubber and plastics, and wood-working.

### Where Employed

Mechanical engineers are employed in all major manufacturing and in most nonmanu-

facturing industries. Many are employed in government agencies, educational institutions, and consulting engineering firms, or as independent consulting engineers.

### Employment Outlook

The outlook is for rapid growth in this branch of the profession, both through the mid-1960's and over the long run. The industries which employ the largest numbers of mechanical engineers—electrical equipment, machinery, fabricated metal products, transportation equipment, and primary metals industries—are expected to continue to expand. Growth of research and development activities in these and

other industries will also require additional mechanical engineers. Moreover, newer areas of work, such as atomic energy, missile and space craft development, and automation will probably provide additional openings for large numbers of mechanical engineers as well as for other engineers and scientists.

Besides those needed to fill new positions, sizable numbers of mechanical engineers are required each year to replace those who retire or die. Recent estimates placed this number at approximately 2,300 in 1960, and it will rise slowly in the future. (See introductory section of this chapter for discussion on training and other qualifications, earnings, and where to go for more information.)

## Metallurgical Engineers

(D.O.T. 0-14.10 and .20)

### Nature of Work

Metallurgical engineers are concerned with the processing of metals and their conversion into commercial products. These engineers usually work in one of two main branches of metallurgy. The first of these, extractive metallurgy, deals with the extraction of metals from their ores, and with refining and related processes. The other branch, physical metallurgy, deals with the content and structure of metals and their alloys and with methods of converting refined metals into final products having a specified strength and hardness or other desired properties.

Persons working in the field of metallurgy are sometimes referred to interchangeably as metallurgists or metallurgical engineers. However, those known as metallurgists are generally engaged in such activities as research and development or analysis and testing, whereas those with the title of metallurgical engineers are engaged mainly in directing the processing of ores.

### Where Employed

Metallurgical engineers are employed chiefly in metalworking industries—especially in iron and steel and nonferrous metals. The metal

mining industry also employs a substantial group. Small numbers hold positions in other industries, government agencies, consulting firms, research organizations, and educational institutions.

Most metallurgical engineers are in the large metal-fabricating centers of the country. Those



*Many engineers are engaged in research aimed at developing new products.*

employed in the mining industry are naturally located chiefly in metal mining regions.

### Employment Outlook

Employment in this small branch of the profession is expected to grow rapidly, both in the near future and over the long run. Increasing numbers of metallurgical engineers will be needed by the metalworking industries to work on problems involved in the adaptation of metals and alloys to new needs. For example, the development of such items as supersonic jet aircraft, missiles, satellites, and space craft has

brought about a need for light-weight metals capable of withstanding both extremely high and extremely low temperatures. Metallurgical engineers will also be needed to solve metallurgical problems connected with the atomic energy program. As the supply of high grade ores diminishes, more metallurgical engineers will be needed to find ways of processing low grade ores now regarded as too unprofitable to mine. (See introductory section of this chapter for discussion on training and other qualifications, earnings, and where to go for more information. See also chapter on Occupations in the Iron and Steel Industry.)

## Mining Engineers

(D.O.T. 0-20.01 and .11)

### Nature of Work

Mining engineers are responsible for the efficient extraction of minerals from the earth. They plan and supervise the construction of mine shafts and tunnels, devise means of extracting the minerals, and plan the methods to be used in transporting the minerals to the surface. Mining engineers also design and supervise the installation of water supplies, electric light and power facilities, and ventilation equipment in mines. They direct the operation of mines and are responsible for mine safety. Some mining engineers work with geologists and other specialists in searching for ore-bearing rock or for deposits of petroleum, coal, or other minerals.

Mining engineers frequently specialize in the extraction of a particular type of mineral—metals, coal, nonmetallic minerals, or petroleum and natural gas. (Petroleum engineering has become so specialized that it is becoming recognized as a separate branch of the profession.) Specialization of mining engineers may also extend to a particular type of work, such as mine safety, mine appraisal, or exploration.

### Where Employed

A large proportion of all mining engineers are employed in the mining and petroleum in-

dustries. The remainder work for colleges and universities, for government agencies, or as independent consultants.

Mining engineers are usually employed at the location of mineral deposits. They may work near small communities or in out-of-the-way places—in mountains or deserts. Those engaged in research, teaching, management, or consulting may, however, be located in large metropolitan areas.

### Employment Outlook

Mining engineering is one of the smaller branches of the profession, and opportunities for new entrants in any one year are expected to be relatively few. In recent years, employment prospects for new graduates with a degree in mining engineering have been less favorable than for those in most other branches of engineering.

Over the long run, mining engineering is expected to grow, although more slowly than most other branches of the profession. As needs for metals increase with the expansion of industry and easily mined deposits are exhausted, mining engineers will probably be needed to devise ways of mining poorer deposits or those which are more difficult to mine at a competitive



cost. Additional areas of employment for mining engineers will arise as the development of new alloys and the discovery of new uses for metals increase the demand for less widely used ores. In the petroleum industry, some mining engineers will be needed to locate and utilize

new oil fields, both in the United States and abroad. (See introductory sections of this chapter for discussion on training and other qualifications, earnings, and where to go for more information. See also chapter on Petroleum Production and Refining Occupations.)

## PHYSICAL AND EARTH SCIENCES

Natural science—the sum of man's knowledge of the physical world and of the animals and plants in it—had its beginnings many centuries ago. At first, scientific knowledge was so limited that men of science did not need to specialize. Aristotle, for example, was familiar with all the science known in his day and was the author of books on both physics and animal life. Gradually, however, the body of scientific knowledge became too great for one individual to grasp in its entirety, and scientists became specialists in different fields.

Today, the natural sciences are customarily grouped into several broad categories: physical sciences—chemistry, physics, astronomy; earth sciences—geology, geophysics, meteorology; life sciences—including animal and plant sciences and microbiology; and mathematics, which is often classified with the physical sciences. Furthermore, most scientists now specialize in subdivisions of these broad fields. Physicists, for example, are usually specialists in such areas as nuclear physics or optics; chemists, in such branches as organic or inorganic chemistry.

The trend toward finer subdivision of the sciences has, in recent years, gone hand in hand with a blurring of the lines between the different specialties. Information and techniques developed by scientists working in one field have, with some new discovery, often become the basis for the solution of problems in a different field. New specialties, such as geochemistry and biophysics, have come into being through a combination of the knowledge of two or more sciences. Thus, the total body of scientific knowledge is interrelated in many ways. No one branch of the natural sciences is entirely independent of all others.

It would be hard to exaggerate the importance of the natural sciences to the country's welfare and to the national defense. Nevertheless, they are still relatively small fields of employment. The total number of scientists at

all levels of professional training was about 335,000 in mid-1960, or 1 scientist for every 225 workers in the labor force. Nearly one-third of all scientists are in chemistry, the largest scientific profession.

Employment of natural scientists has grown rapidly over the last several decades, and particularly since World War II. This growth is a reflection of scientific discoveries which have led to new and improved products and processes in a wide variety of industrial fields. Developments in recent years in aircraft and missiles, in television and radar, in atomic energy, and in a multitude of chemical products are but a few of the best-known examples of the uses of science in the production of necessities and conveniences for modern life. The sciences which have contributed most conspicuously to these developments are chemistry, physics, and mathematics. A number of life science specialties have also had important roles.

Some scientific specialties, such as astronomy and certain branches of mathematics, are still chiefly in the academic realm, with colleges and universities providing most of the employment opportunities. For many of the natural science professions, however, large fields of employment have opened up in the laboratories of business and government during the past four decades. After World War I, advances in chemistry formed the basis for a rapid growth of the chemical industry, and a consequent great expansion in the profession of chemist. Physics became industrially important during the 1920's and 1930's and has grown very rapidly since World War II. Mathematics has always been of fundamental importance to industry but its period of very rapid growth, the seeds of which were sown during World War II, began in the late 1940's and early 1950's. Whereas chemistry fathered a new industry, the impact of physics and mathematics has not been concentrated in any one industry but has been impor-

tant in a number of different ones, notably electronics, professional and scientific instruments, and aircraft manufacturing.

Generally speaking, scientific specialties which do not have large-scale industrial applications are very small fields of employment, affording opportunities chiefly in teaching for persons with advanced training. In order to offer sizable employment opportunities for persons with only 4 years of college training, a science must have developed a field of application—for example, in production or testing activities—where professional work can consist of applying established principles or already existing knowledge to the solution of practical problems—rather than in conducting research.

The outlook in both the near future and over the long run is for the continued rapid growth in employment in most, though not all, of the natural sciences. It is expected that in all science fields there will be considerable demand for graduates with advanced degrees, particularly those with the doctorate, to teach in colleges and universities and to do research work.

This chapter is concerned with the physical and earth sciences and the outlook for the major branches of these professions—chemistry, physics, astronomy, geology, geophysics, and meteorology—is discussed in detail in the statements which follow. The biological sciences and mathematics and related fields are discussed in separate chapters. (See index for page numbers.)

## Chemists

(D.O.T. 0-07.02 through .85)

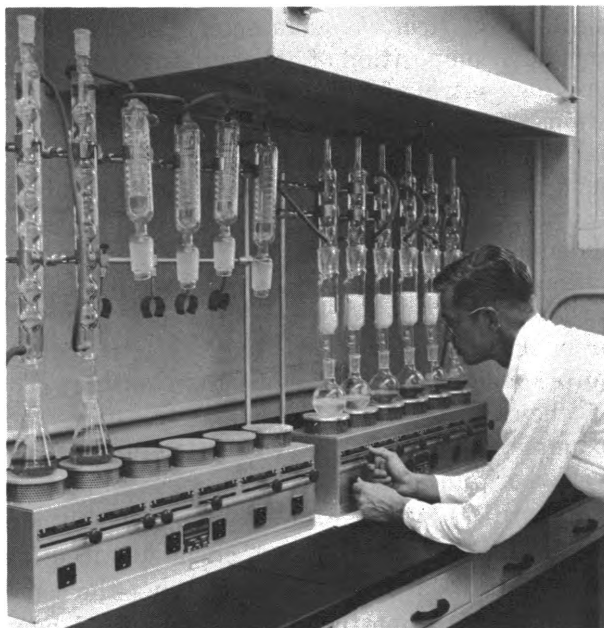
### Nature of Work

Most people visualize the chemist as someone in a white coat working in a laboratory with a maze of glass tubing and intricate apparatus. This picture is reasonably accurate. The majority of chemists are employed in laboratories, chiefly in research and development or in analysis and testing work. Those engaged in research and development usually work on applied research projects aimed at creating new products or improving and finding new uses for existing ones. Detergents, antibiotics and other wonder drugs, fabrics made from synthetic fibers, and rocket fuels are only a few examples of the vast range of products which research chemists have helped to create. In addition, many research chemists work on basic research projects; their interest is in extending scientific knowledge, not in solving immediate practical problems. Many important discoveries have stemmed from basic research. For example, research on polymerization—how and why certain small molecules unite to form giant molecules—resulted in the development of synthetic rubber and nylon.

Analysis and testing is another major activity in which many chemists are engaged. These chemists analyze the composition of sub-

stances and test them to determine their quality, purity, and other characteristics. Tests of various kinds must be made at practically every stage in the manufacture of a product, from its initial development to its production for sale.

Other activities in which sizable numbers of



Courtesy of U.S. Department of Agriculture

*Chemists often work with complex laboratory apparatus.*

chemists are employed include administrative work and college teaching. Smaller numbers of chemists are employed as sales representatives by chemical companies and other manufacturers; companies are especially likely to employ scientists as salesmen when the nature of the products is such that the salesmen must be able to discuss their technical aspects and tell customers how they can be used. Still other activities in which some chemists are employed include supervision of production processes, patent work, technical writing, purchasing materials, and marketing research. A few work as independent consultants.

Chemists usually specialize in one of the five main branches of chemistry—organic, inorganic, physical, analytical, or biochemistry. They may even specialize in a subdivision of one of these branches. *Organic chemists*, the largest group, usually deal with carbon compounds—substances originally derived from animal and vegetable matter. *Inorganic chemists* are chiefly concerned with compounds of other elements, including most of the minerals and metals. *Physical chemists* study the quantitative relationships between chemical and physical properties of both organic and inorganic substances—for example, how these substances are affected by electricity, pressure, heat, and light. *Analytical chemists* determine the exact chemical composition of substances and thereby provide controls for all types of chemical operations. Biochemists are concerned with chemical reactions occurring in plants and animals, such as the effects of food or chemicals on plant and animal tissues, and with the influence of chemicals on life processes.

Some chemists specialize in a particular industry or product, such as petroleum, plastics, or rubber. In many instances, such work requires a knowledge of more than one branch of chemistry. The specialist in plastics, for example, may need a knowledge of physical as well as organic chemistry.

Regardless of their field of employment or specialization, however, all chemists need to know the fundamentals of chemistry—the composition and properties of substances and how they can be changed. They also need a knowledge of the processes required to obtain sub-

stances from nature or produce them synthetically and are concerned with the ways in which these substances can be put to practical use.

### Where Employed

Chemistry is by far the largest field of employment in the sciences. There were approximately 100,000 chemists in the country in mid-1960; about 5 percent of them were women.

The largest number of chemists—more than three-fourths of the total in 1960—are employed by private industry. The major industrial employer of chemists is the chemicals industry, which employed more than four-fifths of all chemists in private industry in 1960. Other industries utilizing relatively large numbers of chemists are the petroleum, food, primary metals, and electrical equipment industries. Sizable numbers of chemists are also employed in colleges and universities and by Federal, State, and local governments. The Federal Government agencies employing the most chemists are the Department of Defense; the Department of Health, Education, and Welfare; the Department of Agriculture; and the Department of the Interior. Smaller numbers of chemists are employed by research institutes, foundations and other nonprofit organizations, and by independent commercial laboratories.

### Training and Other Qualifications

A bachelor's degree with a major in chemistry is usually the minimum educational requirement for beginning chemists. Graduate training, preferably the doctor's degree, is highly desirable.

Chemists with the bachelor's or master's degree usually find employment in manufacturing industries—particularly the industrial chemicals industry. Sizable numbers also find opportunities in government agencies, as research workers. Some of those with the bachelor's or master's degree are employed in colleges and universities as graduate assistants or instructors while taking graduate work.

Beginning chemists with the Ph. D. degree are most likely to enter research and development work or teaching. In fields such as biochemistry

and physical chemistry, in which teaching and research positions are predominant, the doctorate is necessary for most jobs.

Beginning chemists with the bachelor's or master's degree usually start out as trainees in laboratory research or development, or in analysis, testing, quality control, technical service, production, or sales. With additional experience they may advance to positions of greater responsibility, sometimes to high-level research and management positions. In industry, employers usually have special training programs for chemistry graduates. Those programs are designed to supplement college training with specific industry techniques and to aid in determining the type of work for which the individual is best suited.

### Employment Outlook

Employment opportunities for well-trained chemistry graduates are expected to be good during the mid-1960's, and the long-run outlook is for continued expansion of the profession. As in recent years, there will probably be particular need for chemists with advanced degrees, for research and teaching positions.

The anticipated growth in research and development activities, in which about one-half of all chemists are engaged, is expected to be one of the major factors tending to increase employment of chemists. Total expenditures for research and development have increased rapidly in recent years, and are expected to continue to grow during the next decade. The continued expansion of the industries which employ the largest numbers of chemists will also be an important factor. In particular, the chemicals industry, which employs nearly one-third of all chemists, is expected to grow further during the next decade.

The demand for chemists to fill college and university teaching positions should also rise substantially, primarily because of the increases in total college enrollments anticipated during the mid-1960's. The greatest demand will be for those with Ph. D. degrees, but there will be many positions for chemists with the master's degree. (See index for page number of statement on College and University Teachers.)

In addition to those needed to fill new positions, many chemists will have to be trained each year to replace members of the profession who retire, die, or transfer to other occupations. Losses to the profession from retirements and deaths alone were estimated to be approximately 1,000 in 1960 and may rise considerably during the next 10 years.

Along with the expected growth in demand for chemists, a steady increase in the number of chemistry graduates is expected. If graduates in this field continue to represent the same proportion of all college graduates as in recent years, the number seeking employment in the profession will rise rapidly during the next decade. Thus, there may be competition for the better paying professional entry positions in chemistry, particularly for graduates with only the bachelor's degree. However, the rising demand for chemists with ability and thorough training will continue to provide favorable opportunities for such graduates for many years to come.

### Earnings and Working Conditions

Chemistry graduates with bachelor's degrees and no experience had an average (median) starting salary of \$490 a month in private industry in 1960, according to a survey conducted by the American Chemical Society. Graduates with the master's degree and no experience averaged \$560 a month and those with the Ph. D. degree, \$763.

In the Federal Government, the annual starting salary for chemists with the bachelor's degree and no experience was either \$5,335 or \$6,345 in 1960, depending on the individual's college record. Chemists with the master's degree could start at \$6,345 or \$6,435, and those with the Ph. D. degree at \$7,560 or \$8,955.

In academic institutions, the average starting salary for graduates with bachelor's degrees and no experience was \$354 a month. Graduates with the master's degree averaged \$403 a month and those with the Ph. D. degree, \$513.

Most chemists can look forward to a marked increase in earnings as they gain experience. According to the National Science Foundation's 1960 National Register of Scientific and Tech-

nical Personnel, the average (median) salary of chemists with 5 to 9 years of experience was \$8,000 a year and that of chemists with 20 or more years of experience about \$12,000. Nearly all (90 percent) of the chemists with 20 years of experience earned at least \$8,000 and a few (10 percent) earned \$20,000 or more.

Chemists in private industry tend to have higher incomes than those in other types of employment. For example, the median annual professional salary of chemists was about 10 percent greater in private industry than in Federal Government employment, and nearly 25 percent greater than in colleges and universities, according to the 1960 Register. However, many chemists in colleges and universities supplement their regular salaries with income

from other sources, such as consulting work, special research projects, and writing for publication. Within a particular field of employment, holders of Ph. D. degrees usually earn considerably more than those with bachelor's or master's degrees.

#### Where To Go for More Information

American Chemical Society,  
1155 16th St. NW., Washington 6, D.C.

Manufacturing Chemists Association, Inc.,  
1825 Connecticut Ave. NW., Washington 9, D.C.

For additional sources of information, see also Chemical Engineers and Industrial Chemicals Industry. (Refer to index for page numbers.)

## Physicists

(D.O.T. 0-35.73)

### Nature of Work

Physics, one of the most rapidly growing scientific professions, is concerned with energy in all its forms, with the structure of matter, and with the relationship between matter and energy. Physicists try to discover the fundamental laws of nature, and to understand how these laws may be put to use. Much of the scientific progress in the past several decades stems from discoveries made by physicists in such critical fields as nuclear energy, cosmic rays, and electronics.

Most physicists are engaged in research or college teaching, and many do both. A sizable number conduct basic research, designed to increase scientific knowledge without regard to its practical applications. Those who do basic research may be either "experimental" or "theoretical" physicists. Experimental physicists make careful, systematic observations and perform experiments to identify and measure the elements of matter and energy and their interactions; for example, they may try to determine the density of charged particles in the upper atmosphere or the lifetime of subatomic particles. In their research, they use apparatus such as geiger counters, particle accelerators, X-ray spectrometers, electron diffraction cam-

eras, microwave devices, and phase and electron microscopes. When their research requires new kinds of instruments, they design and sometimes build them. Theoretical physicists, on the other hand, seek to work out mathematical descriptions of the relationships between physical phenomena. They may use no apparatus at all but may work out their theories on paper. Some physicists are interested both in the development of theory and in experimentation.



*Physicist using microwave spectroscopy to measure atom masses.*

The difference between theoretical and experimental physicists is often merely one of emphasis in their work.

A large number of physicists do applied research. They use the knowledge gained from basic research to solve practical problems and to create new products for industry or for national defense. For example, the work of physicists specializing in solid-state physics led to the development of transistors, which are being used in place of vacuum tubes in many types of electronic equipment, ranging from hearing aids to guidance systems for missiles.

Some physicists are engaged in the management and administration of scientific activities. Still others do work related to the production of industrial products, including inspection and quality control. A few physicists do technical writing or consulting work.

Modern physics covers such a large area of knowledge that most physicists specialize in one or more branches of the science—mechanics, heat, light, sound, electricity and magnetism, electronics, atomic and molecular phenomena, nuclear physics, physics of fluids, solid-state physics, classical theoretical physics, or quantum mechanics. In addition, new fields are continually emerging; for example, cryogenics, plasma physics and ultrasonics are new fields which have developed in recent years. Nearly all physics specialties, however, have a close interrelationship, and many physicists do work which cuts across a number of specialties. Every specialty of the profession utilizes principles and methods drawn from other branches of physics, and all rest on the same fundamental principles.

Physicists often apply the theories and methodology of their science to problems originating in other sciences, including geology, biology, chemistry, and astronomy. Some people have become specialists in both physics and related sciences. Thus, a number of scientific specialties have developed on the border line between physics and other fields—geophysics, biophysics, physical chemistry, and astrophysics. (Information on these occupations is contained elsewhere in the Handbook. See index

for page numbers.) Furthermore, the practical applications of physicists, work has increasingly merged with engineering.

### Where Employed

More than 30,000 physicists were employed in the United States in mid-1960. The largest number of physicists—more than half of the total—were employed by private industry. About 9,000 worked for colleges and universities, and approximately 4,000 for Federal Government agencies. The remainder were employed chiefly by research institutes, foundations and other nonprofit organizations, and by independent commercial laboratories.

The industries employing the most physicists are the electrical equipment and the aircraft and missile industries. These two industries employed more than half of all physicists in private industry in 1960. Other industries utilizing relatively large numbers of physicists include the chemicals, professional and scientific instruments, telecommunications and broadcasting, petroleum, and machinery. Most physicists in private industry work chiefly on research and development projects.

Although teaching is the main activity of most physicists in colleges and universities, a sizable number of those employed by such institutions work full time in research, often on projects conducted for the Federal Government. Part of the research of the Atomic Energy Commission and the National Aeronautics and Space Administration, for example, is done in laboratories operated by universities.

The Government agencies employing the most physicists are the Department of Defense, the National Aeronautics and Space Administration, and the National Bureau of Standards of the Department of Commerce. A few members of the profession work directly for the Atomic Energy Commission, the Department of the Interior, and the Department of Agriculture.

Relatively few physicists are women—only about 2 percent, according to the National Science Foundation's National Register of Scientific and Technical Personnel.

### Training and Other Qualifications

A bachelor's degree with a major in physics is the minimum entrance requirement for young people seeking careers as physicists. Graduate training, preferably a doctor's degree, is highly desirable. Anyone interested in becoming a physicist should take as much mathematics as possible; a serious deficiency in this subject is almost impossible to overcome.

A doctor's degree is required for appointment to some positions and is definitely preferred for many others. The Ph. D. degree is usually necessary for advancement in high-level teaching positions in a college or university. In research projects at academic institutions and in the Federal Government, the greatest demand is also for physicists with the extensive training represented by the doctor's degree. Many private companies prefer to hire physicists with Ph. D. degrees because of the complex nature of their research problems.

Physicists with master's degrees usually qualify for applied research activities in private industry, educational institutions, and the Government, and for appointment as physics instructors in some colleges and universities. Frequently, graduate students working toward a doctor's degree are assigned to teach beginning college courses in physics, conduct laboratory sessions, or aid senior faculty members on research projects.

Most physicists with bachelor's degrees find jobs with private industry or the Federal Government, usually in applied research and development work. Some physicists become research assistants in colleges and universities while working toward advanced degrees. A bachelor's degree is seldom sufficient for full professional development as a physicist. Many persons with only a bachelor's degree in the science do not work as physicists but go into nontechnical work or, sometimes, into engineering positions.

Approximately 100 colleges and universities offered Ph. D. degrees and about 200 offered master's degrees in physics in 1960. Nearly 650 colleges and universities had a department of physics which offered an undergraduate major in the science. In addition, many engineering schools offer a physics major as part of

the general engineering curriculum. Many schools have also set up an engineering physics or industrial physics curriculum leading to a bachelor's degree, which provides training in "applied physics in an engineering atmosphere." Personnel with this combination of physics and engineering training are being increasingly sought by industrial firms.

Among the chief personal qualifications needed for a career in physics are a disciplined and creative imagination and a highly inquisitive mind. Strong interest and facility in mathematics are also essential.

### Employment Outlook

The outlook is for continued rapid growth in employment of physicists, both through the mid-1960's and over the long run. As in recent years, there will probably be a particular demand for physicists with Ph. D. degrees who are qualified to teach advanced physics courses and do basic research or advanced applied research and development work. Research organizations, whether those of government, universities, or industry, have had considerable difficulty in filling their requirements for physicists with advanced degrees, and their needs for such physicists will probably continue to increase.

Among the major factors which should continue to make physics one of the most rapidly growing science fields in the next decade is the continued increase in expenditures for research and development by both industry and government. Total expenditures for scientific research and development in the United States increased from \$5.4 billion in 1953 to more than \$13 billion in 1960-61. Such expenditures are expected to continue to increase during the next decade. Moreover, much of this increase will take place in those science-based industries which employ large numbers of physicists, particularly in the industries producing electrical and electronic equipment, aircraft, missiles, and spacecraft.

Demand for physicists qualified to teach in colleges and universities is also expected to increase substantially, both to provide for the much larger enrollments expected in the late



1960's and to meet the growing need for advanced physics training in other science fields and in engineering. During the late 1950's and early 1960's, many colleges were unable to recruit sufficient numbers of well qualified physics teachers, and this problem may well become acute during the next decade. (See index for page number of statement on College and University Teachers.)

Along with the anticipated rise in demand for physicists, an increase is expected in the number of physics graduates, especially at the bachelor's level. If physics graduates continue to represent the same proportion of all college graduates as in recent years, the number seeking employment in the profession will rise rapidly during the 1960's. Nevertheless, unless the annual number of degrees awarded in physics rises far above anticipated levels, the demand for persons trained as physicists is expected to be greater than the number of new graduates available for employment. Very good employment opportunities are thus in prospect in the profession through the mid-1960's, at least, and probably for much longer. For physicists with Ph. D.'s, in particular, employment opportunities should be excellent during the next decade.

#### **Earnings and Working Conditions**

Starting salaries for physicists with bachelor's degrees were usually between \$5,600 and \$6,500 a year in private industry in 1960, according to the limited information available. Physicists with master's degrees received starting salaries about \$500 to \$1,000 higher than those with bachelor's degrees. Annual salaries for new graduates with Ph. D. degrees ranged roughly from \$7,500 to as high as \$15,000.

In Federal Government positions in 1960, physicists with bachelor's degrees and no experience could begin at either \$5,335 or \$6,345 a year, depending on the individual's college

record. Beginning physicists with 1 full year of graduate study could begin at \$6,345; those with 2 full years of graduate study at \$6,435. Physicists with the Ph. D. degree could start at \$7,560 or \$8,955.

Comparable information on beginning salaries of physicists employed as college and university teachers is not available. Some indication of their salary levels, however, may be obtained from the salary figures for college and university teachers as a group. This information is presented in the statement on college and university teachers. (See index for page number.) In addition to their regular salaries, many physicists in educational institutions obtain income from other sources, such as consulting work and special research projects.

Most physicists can look forward to a marked increase in earnings as they gain experience. According to the National Science Foundation's 1960 Register of Scientific and Technical Personnel, the average (median) annual salary of physicists with 5 to 9 years of experience was \$10,000 a year and that of physicists with 20 or more years of experience was about \$13,000. Nearly all (90 percent) of the physicists with 20 years of experience earned at least \$8,000 and a few (10 percent) earned \$21,000 or more.

In general, physicists in private industry tend to have higher incomes than those in other types of employment. For example, the median annual salary of physicists was about 20 percent greater in private industry than in Federal Government employment, and about 50 percent greater than in colleges and universities, according to the 1960 register. Within a particular field of employment, physicists with Ph. D.'s usually earn considerably more than those with the bachelor's or master's degree.

#### **Where To Go for More Information**

American Institute of Physics,  
335 East 45th St., New York 17, N.Y.

## Astronomers

(D.O.T. 0-35.61)

### Nature of Work

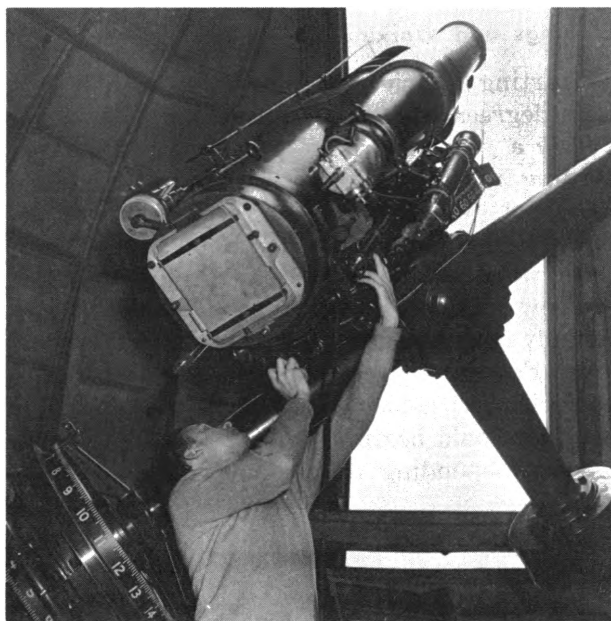
Astronomy, often considered the most theoretical of all sciences, serves the Nation in a variety of ways. Astronomical observations of the sun, moon, planets, and stars are the basis for sea and air navigation, the calendar, and the accurate measurement of time. Astronomy provides both a proving ground for theories of time and space and a laboratory where matter and energy may be observed under the most extreme conditions of temperature and density. Astronomy also helps fill in gaps in the understanding of the physical world. For example, astronomers who have studied the behavior of atoms under stellar temperatures have made valuable contributions to thermonuclear research and to knowledge of the atom.

Astronomers study the universe and all its celestial bodies. They collect and analyze data on the sun, moon, planets, and stars and attempt to determine their sizes, shapes, brightness, and motions. They compute the positions of the stars and planets; calculate the orbits of comets, asteroids, and artificial satellites; and make statistical studies of stars and galaxies. Astronomers also study the size and shape of the earth and the density of its upper atmosphere.

In making their detailed observations of the heavens, astronomers use complex photographic techniques, light-measuring instruments, and optical devices. The telescope is the major instrument used for observation, and specialized devices are often attached to the telescope for making particular types of observations. Among these devices are the spectrometer, which measures the wave lengths of radiant energy (by means of its spectrum); the photometer, which measures the intensity of light; and various other photoelectric, photographic, and electronic instruments and devices. Although most observations are made by means of telescopes permanently mounted in observatories, astronomers sometimes gather information by sending aloft balloons and space vehicles containing various measuring devices. In process-

ing and analyzing the data derived from their observations, astronomers often utilize high-speed electronic computers.

Astronomers usually specialize in one of the many branches of the science. In *astrophysics*, they apply the techniques and concepts of physics to astronomical problems, principally in an attempt to determine the temperature, luminosity, and chemical composition of heavenly bodies. Some astronomers work in the field of *celestial mechanics*, one of the earliest fields of astronomy and one that has recently acquired new importance. Celestial mechanics deals with the motions of objects in the solar system, and hence has a particular application in the calculation of the orbits of artificial earth satellites and the paths of guided missiles. *Radio astronomy* is the study, by means of radio telescopes of extraordinary sensitivity, of the source and nature of celestial radio waves. Among the other specialties are astrometry (measurements of apparent positions of celestial bodies); photoelectric and photographic photometry (measurement of the intensity of light); spectroscopy of astronomical sources (analysis of the wave



Courtesy of U.S. Navy

*Astronomer adjusting telescope to photograph the stars.*

lengths of radiation from celestial bodies); and statistical astronomy (statistical study of large numbers of stars to determine their average properties).

About three out of every four astronomers are engaged in teaching, research, or some combination of the two. In colleges and universities without separate departments of astronomy or with small enrollments in the subject, astronomers may teach courses in mathematics or physics as well as astronomy. Other members of the profession are engaged in a variety of activities, including management, development and design of astronomical instruments, technical writing and consulting.

### Where Employed

Astronomy is one of the smallest of the science fields; the total number of astronomers in the United States was estimated to be only about 500 in 1960. More than half of all astronomers are employed by colleges and universities. Many of these work in university-operated observatories, where they usually devote most of their time to research, working by themselves or in cooperation with other astronomers.

The Federal Government provides employment opportunities for a number of astronomers. Among the major Government agencies employing astronomers are the National Aeronautics and Space Administration, which is responsible for directing and implementing U.S. research efforts in aeronautics and the exploration of space; the U.S. Naval Observatory, which determines the Nation's official time, provides data for air and sea navigation, and conducts research in astrometry and stellar astronomy; the Naval Research Laboratory, which does research in radio astronomy and space astronomy; and the Army Map Service, which utilizes astronomers in measuring exact distances and in determining the positions of points on the earth's surface. Government positions in astronomy may also be found at the Air Force Cambridge Research Center (Bedford, Mass.), the Smithsonian Astrophysical Observatory, the U.S. Coast and Geodetic Survey, the National Bureau of Standards, and other agencies.

A very small but growing number of astronomers are employed in private industry, mostly by firms in the aircraft and missile industry. A few astronomers work for museums, planetariums, and other organizations.

### Training and Other Qualifications

A Ph. D. degree in astronomy is extremely important for persons who hope to attain high-level professional positions in this field. Colleges and universities usually appoint only astronomers who have received the doctorate or who are working towards it, and observatories are equally strict in their hiring requirements. Some beginning astronomer positions in the Federal Government and private industry do not require the doctorate, but opportunities for advancement for those with a Ph. D. degree are more favorable.

New graduates with bachelor's or master's degrees in astronomy usually obtain employment mainly in semiprofessional or starting positions in observatories, planetariums, large departments of astronomy in colleges and universities, Government agencies, or industry. Among these workers are research assistants, computers, photographers, optical workers, observers, and technical assistants. The position of research assistant is a particularly desirable one for astronomical workers who do not have the Ph. D. degree. An appointment as research assistant in an observatory or university provides opportunity for active participation in astronomical research programs and close association with top rank professional astronomers. Some persons with only the bachelor's degree take these research assistant positions while working toward advanced degrees.

Young people seeking careers as astronomers need not wait until they go to college to start their preparation. They should begin while still in high school by taking all of the mathematics and science offered. Courses in physics, chemistry, and a foreign language are particularly valuable.

Upon graduation from high school, the prospective astronomer should attend a college or university that offers a great many courses in physics and mathematics in addition to some

courses in astronomy. A reading knowledge of at least one foreign language (German, French, or Russian) is essential, and training in chemistry, statistics, and electronics is useful. A few of the courses often taken by undergraduates in the field of astronomy are optics, spectroscopy, atomic physics, calculus, differential equations, solar and stellar systems, introductory astrophysics, and astronomical techniques and instruments.

Bachelor's degrees in astronomy are offered by a relatively small number of schools. In 1960, only about 30 colleges and universities offered such a degree. A prospective astronomer is not necessarily handicapped if he is unable to obtain such a degree, however, since the undergraduate work required for a degree in astronomy is similar to that required for a degree in physics or mathematics. Consequently, the student with a degree in physics or mathematics and with some courses in astronomy should encounter little difficulty in pursuing graduate work leading to the Ph. D. in astronomy. Conversely, students with bachelor's degrees in astronomy can usually obtain positions in the fields of physics or mathematics, if they so desire.

Training leading to the doctorate in astronomy may be obtained in about 20 institutions located in various sections of the country. The academic work of the graduate student seeking the Ph. D. degree in astronomy consists primarily of advanced courses in astronomy, physics, and mathematics. A few of the astronomy courses typically offered in graduate school are celestial mechanics, galactic structure, radio astronomy, stellar atmospheres and interiors, theoretical astrophysics, and variable stars. Some schools require that graduate students spend several months in residence at an observatory. In most institutions, however, the program of work leading to the doctorate is flexible and allows the student to take the courses which will be of most value to him in his astronomical specialty or particular area of interest.

New astronomy graduates employed by educational institutions normally begin as instructors. Advancement is usually from instructor, through assistant and associate professor, to full professor and, on occasion, to department

head or other top positions. Astronomers sometimes move from a small college to a large university or from a position in which most of their time is spent teaching to one which offers more opportunity for research. Because of the opportunity it offers to carry on research, a professional position in a large observatory, either university- or government-operated, is considered by many to be the most desirable position in the field of astronomy.

Entry into Federal Government positions is on the basis of competitive examinations. Such examinations are given continuously by the Board of U.S. Civil Service Examiners for Scientific and Technical Personnel of the Potomac River Naval Command, Washington 25, D.C. Advancement in Government service depends upon the individual astronomer's ability, education, and experience.

The student planning a career in astronomy should consider not only whether he has the financial means and the perseverance necessary for the 7 or more years of college study, but also whether he has the necessary personal qualifications. The personal qualifications desirable in an astronomer are very much the same as those which nearly every scientist needs for success—among them a deep curiosity about the nature of the physical world, precise and logical thought processes, a strong interest and facility in mathematics and physics, and a fertile imagination. Astronomers should also be able to express themselves clearly and simply, both in writing and speaking, since their work often requires them to communicate not only with other astronomers and scientists, but with the public as well. Perhaps the most striking and singular personal characteristic possessed by most successful astronomers is a deep and abiding love for their field of science. A young man without this feeling of dedication may find that the rewards of astronomy, both financial and psychological, are not enough payment for the years of intensive preparation required.

### Employment Outlook

Employment opportunities for astronomers with the Ph. D. degree are expected to be ex-

cellent through the mid-1960's. Well-trained persons with only bachelor's or master's degrees in astronomy will also have good employment prospects, primarily as research and technical assistants. As in the past, however, the higher level professional positions in astronomy will be filled mainly by persons with doctorate degrees.

The outlook is for rapid growth of this small profession, both in the mid-1960's and over the long run. America's entry into the space age—the age of rockets, guided missiles, manmade earth satellites, and space travel—has heightened interest in astronomy and is opening up large new fields for astronomers. These scientists will be needed to aid in the development of guidance systems and other instrumentation for missiles and satellites and to help solve many of the problems connected with the flights of missiles, space vehicles, and artificial earth satellites.

Increased research activities in astronomy by educational institutions, government, and industry are also expected to add to the demand for astronomers. In recent years, the growth of Federal Government sponsored research, in the form of grants to educational institutions and observatories (for astronomical research and for new buildings and equipment), has opened many new positions for astronomers. In all probability, government expenditures for research will continue to grow. Additional astronomers will also be needed by industry to conduct further research on manned satellites and space stations, as well as on problems involved in charting rocket courses to the moon and nearby planets.

The growing public interest in satellites and space exploration has created a demand for a greater amount of popular information on astronomy. Furthermore, enrollments in astronomy courses in colleges and universities are likely to increase, not only as a result of this heightened public interest but also due to the growing awareness of the value of astronomical training in many other scientific and engineering specialties. These factors, coupled with the anticipated increases in college enrollments, are expected to create many new openings for teachers of the science.

Since astronomy is a small profession, the number of job openings in any one year will not be large. On the other hand, the number of college students taking the rigorous and lengthy programs in astronomy has so far been small. In 1959, only 28 bachelor's, 21 master's, and 17 doctor's degrees were awarded in astronomy. Thus, the young men or women who obtain the necessary training should have excellent employment opportunities during the 1960's.

Job prospects for graduates in astronomy without the Ph. D. are also expected to be favorable during the next decade, particularly for work as research assistants in astronomy departments or laboratories. Research assistants are being utilized more and more in research programs, under the direction of the professional staff. Numerous other openings for these graduates are expected to arise during the next decade for employment as technicians, such as computers and photographic and electronic experts. These assistants and technicians are not usually regarded as professional astronomers, however, and without the Ph. D. degree their chances of promotion may be limited.

For women astronomers, particularly those with the Ph. D., the most favorable opportunities will be in teaching and research positions in women's colleges and in the larger co-educational institutions. Government agencies are also expected to offer some employment opportunities for women astronomers. In addition, some openings for research assistants or computers in observatories or universities will probably arise for women with bachelor's or master's degrees in astronomy.

### **Earnings and Working Conditions**

Astronomy, like many other scientific fields, offers its scientists a comfortable living. According to information from the National Science Foundation's 1960 National Register of Scientific and Technical Personnel, the average (median) annual salary of astronomers was \$9,000. About 25 percent earned more than \$12,000 a year and 10 percent earned \$14,000 or more.

In the Federal service in 1960, beginning astronomers with the Ph. D. degree were eligi-

ble to enter at \$7,560 or \$8,955 a year, depending on their college record. Astronomers with the bachelor's degree could start at \$5,335 or \$6,345 a year, depending on their college record. Beginning astronomers with 1 full year of graduate study could begin at \$6,345; those with 2 full years of graduate study at \$6,435. Some astronomers in high-level government positions earned more than \$14,000 a year in 1960. As in educational institutions, the Ph. D. degree is usually required for promotion to the higher level and better paying professional positions.

Astronomers in educational institutions receive roughly the same salary and have the same prerogatives and responsibilities as other faculty members. (Detailed information on salaries of college and university teachers is contained in the section on College and University Teachers. See index for page number.) Astronomers in educational institutions often earn some professional income in addition to their regular salaries. Consulting work is one source of extra income for astronomers, as is summer school or other teaching that is not a part of their regular duties. A few astronomers in colleges and universities earn some income from lectures and from books and articles.

Some astronomers spend considerable time in nightwork, making visual observations or setting up and adjusting the telescope for photographic and photoelectric work. Others make observations and photographs 4 or 5 nights each month and devote the remainder of the time to studying and analyzing the plates and other findings during usual daytime working hours. Astronomers' hours of work may range from a 40-hour week, when they are studying and analyzing data and photographic plates, to considerably more than 40 hours, when they are engrossed in a particularly interesting or perplexing problem. Observational work at a telescope involves exposure to the outside air through the open dome of the observatory, even on cold winter nights. In general, however, the physical requirements of astronomical work are not heavy and can be met by a reasonably healthy person.

#### Where To Go for More Information

The American Astronomical Society, Dearborn Observatory,  
Northwestern University, Evanston, Ill.

## Geologists

(D.O.T. 0-35.63)

### Nature of Work

Geology is the science of the earth. Geologists study the earth's history, structure, and composition as revealed by rock formations on and under its surface and by fossil remains of animal and vegetable life. They search for valuable fuels and minerals and study the physical processes which bring about changes in the earth's structure and surface features.

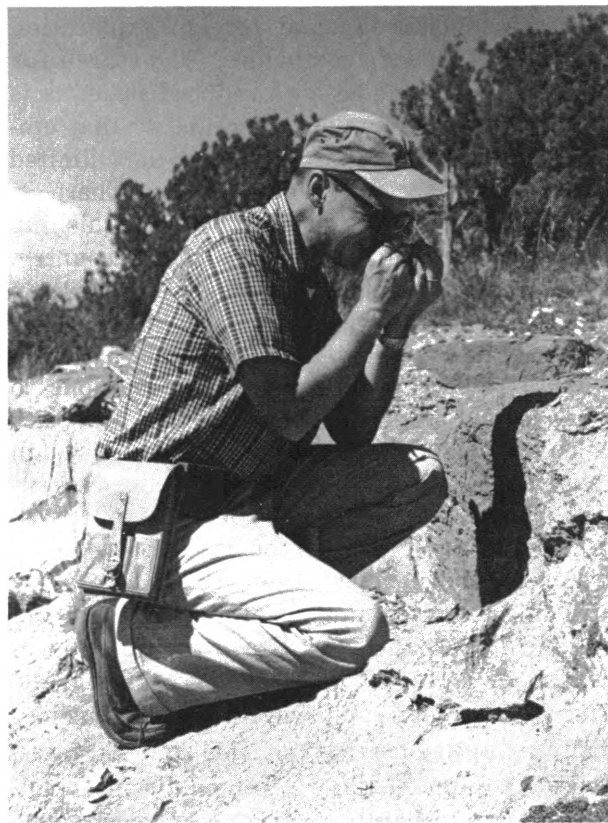
Most geologists spend a large amount of their time in field work in different parts of the United States or foreign countries. This field work may involve drilling into the earth and studying the rock cores and cuttings brought up by the drills; collecting and examining fossils, minerals, and rocks; recording data; and preparing geological maps. Geologists also spend considerable time in their laboratories

and offices. In the laboratory, they study geological specimens and do other research. In the office, they work on reports, articles, maps and other illustrations incorporating the findings of field and laboratory investigations. A large number of geologists perform administrative and executive functions. In colleges and universities, geologists often combine teaching with research and administrative work.

Geologists usually specialize in one particular branch of the science. *Economic geologists* find and develop mineral resources. *Petroleum geologists*, who locate new deposits of oil and gas, are also economic geologists but are generally regarded as a separate category of specialists, mainly because they make up the large majority of all geologists. *Engineering geologists* apply geological knowledge to the solution of engi-

neering problems, such as the construction of tunnels, airfields, and dams. *Paleontologists* identify and classify fossils from past geological periods. *Stratigraphers* study the arrangement of the rock layers in the earth's crust. *Petrologists* and *petrographers* study the origin and composition of rocks. *Mineralogists* are concerned with the physical and chemical properties of minerals, and the ways of classifying them and of distinguishing them from each other. *Geomorphologists* are concerned with the form of the earth's surface and with the forces—such as erosion, glaciation, and sedimentation—which cause changes in the landscape. *Structural geologists* study the structure of rocks, the origin of mountains, and the forces which deform the earth's crust.

*Geochemists* are a small but growing group of specialists with extensive training in both geology and chemistry. Scientists specializing in this field are concerned with the application of chemistry to geological problems.



Courtesy of U.S. Geological Survey

*Geologist examining mineral grains with a hand lens.*

Hydrology is another specialty in which growing numbers of geologists are engaged. These scientists are concerned with the waters of the earth—their occurrence, circulation, and distribution; their chemical and physical properties; and how they can be controlled and put to use. (Hydrology is often considered a branch of geophysics and is also discussed in the statement on Geophysicists which follows.)

### Where Employed

In 1960, there were approximately 15,000 geologists in the United States. Most geologists, probably about three out of every four, work for private industry. The petroleum and natural gas industry employs most of these scientists—chiefly in Texas, Louisiana, California and Oklahoma, but to some extent also in many other States and in foreign countries. Some geologists are employed by mining and construction companies, by railroads and other public utilities, and by manufacturing concerns, especially in the primary metals and stone and clay products industries. Others work for consulting firms or as independent consultants, providing services on a fee basis to companies interested in exploration for and extraction of minerals and fuels.

A sizable number of geologists are employed also by the Federal Government and by colleges and universities. In 1960, about 80 percent of all the geologists on Federal payrolls worked for the U.S. Geological Survey of the Department of the Interior. Other Federal agencies employing geologists include the Corps of Engineers of the Department of the Army, the Soil Conservation Service of the Department of Agriculture, and the Bureau of Reclamation of the Department of the Interior. State government agencies also employ a number of geologists, many of whom work on surveys conducted in cooperation with the U.S. Geological Survey. Most government positions are located in the United States, though some Federal jobs are in the possessions and in foreign countries. Some geologists teach and do research in colleges and universities. A few geologists work for nonprofit research institutions and museums.



### Training and Other Qualifications

Young people seeking professional careers in geology should, if possible, obtain an advanced degree. Although the bachelor's degree with a major in geology has heretofore been adequate for many jobs, graduate training is now considered necessary for a great many positions. At least the master's degree, and often the Ph. D., was required for most entry jobs in private industry in 1960. While a few top-ranking graduates with the bachelor's degree could qualify for positions with some Federal agencies, the Geological Survey was looking for people with advanced degrees, particularly the Ph. D. degree, to fill full-time positions.

Training beyond the bachelor's level is extremely helpful to geologists in competing not only for professional entry positions but also for advancement to more desirable jobs. The Ph. D. degree is usually essential for college teaching careers and for most research posts.

Many colleges, universities, and institutes of technology offer training in geology. In 1959, according to the U.S. Office of Education, bachelor's degrees in the science were awarded by 206 institutions, master's degrees by 89, and doctorates by 41.

In most colleges and universities, students majoring in geology devote about a fourth of their time to geology courses during the 4 years of undergraduate study. Usually, about a third of the work is in related natural sciences and in mathematics, and the remainder is in other subjects such as English composition, economics, and foreign languages. Some colleges have a more intensive curriculum, leading to a bachelor's degree in geology, under which as much as half of the undergraduate course work is in geology. In some schools of engineering which offer undergraduate programs in geological or petroleum engineering and petroleum geology, as much as 90 percent of the work may be in the major field and related technical subjects.

The student who plans a career in geology should have an aptitude for science and mathematics. He should like outdoor activities and have sufficient physical stamina to participate in geological field work, which often necessi-

tates camping out under primitive conditions. A willingness to travel is important, in view of the frequency with which geologists are required to move from place to place in the course of their employment.

### Employment Outlook

Employment opportunities for geologists are expected to be limited through the mid-1960's. The relatively few graduates with the Ph. D. degree should have good employment prospects. New graduates with master's degrees will probably encounter competition for professional positions. Of those with only the bachelor's degree, many may find it necessary to take semiprofessional jobs. Others may take the training in teaching methods and related subjects required to qualify them as science teachers in secondary schools, or may seek other work outside the field of geology.

Worldwide surpluses of oil reserves, resulting from recent discoveries, have caused severe cutbacks in domestic and foreign exploration for oil by American companies. The search for oil is being conducted on a reduced scale, as is the exploration for most minerals, so that employment prospects in these fields will be limited during the early and middle 1960's. There is, however, a growing concern about diminishing water supplies in many parts of the country, and some openings for geologists to work on this problem are expected. In addition, a few hundred new geologists will be needed each year to replace those receiving promotions to managerial positions, transferring to other fields of work, or lost to the profession through retirement or death. These replacement needs will probably be the chief source of openings in the profession through the mid-1960's.

Federal Government agencies will probably hire only a limited number of geologists during the mid-1960's; the exact size of their staffs will depend on appropriations voted by Congress. The U.S. Geological Survey, which has geologically mapped only part of the United States, expects to appoint only a few additional geologists yearly, mainly for mapping work. The agency would, however, have additional openings for geologists with advanced degrees if a



large number of State governments should decide to cooperate with it in joint projects for the surveying and mapping of their land areas.

Colleges and universities also will offer some opportunities for geologists in teaching and research work. College enrollments in general are expected to rise, and geology is a popular course in liberal arts colleges. On the other hand, the numbers of juniors and seniors majoring in geology were substantially fewer in 1960 than in 1959. Unless the numbers majoring in the field start to rise again, there will be relatively little increase in employment of geologists in colleges and universities during the mid-1960's.

The longrun employment outlook in the profession is more favorable. As the world's population expands and nations become more industrialized, the demand for petroleum, minerals, and water supplies will increase, and there will be a rising demand for geologists to locate these resources. Geologists with advanced training will be needed to devise new techniques for exploring deeper within the earth's crust and to search underseas areas; to do more extensive research and analysis of geological data; and to work with petroleum engineers in developing more efficient methods of finding and recovering crude oil.

Few women have become professional geologists. Those seeking such careers face the problem that field work positions usually are considered unsuitable for them. However, some well-qualified women will be able to find positions as teachers in colleges and universities, or to obtain laboratory or office positions in industry and Government.

### **Earnings and Working Conditions**

Monthly starting salaries for new geology graduates with bachelor's degrees ranged typi-

cally from about \$450 to \$485 in private industry in 1960, according to the limited information available. New graduates with master's degrees usually started at between \$510 and \$550 a month. Those with doctor's degrees received yearly starting salaries ranging from \$7,000 to \$10,000, depending upon their individual qualifications.

In the Federal Government, new graduates with bachelor's degrees could begin at either \$5,335 or \$6,345 a year in 1960, depending on their college records. Those with master's degrees could start at \$6,345 or \$6,435, and those with the Ph. D. degree at \$7,560 or \$8,955. Some geologists in supervisory positions were earning \$12,000 a year, and a few in high-level posts had larger salaries.

Earnings of geologists are usually somewhat higher in private industry than in Government agencies. Salaries in educational institutions are usually lower than in either industry or the Federal Government, but teachers have the advantage of long summer vacations during which they can supplement their salaries by doing research, consulting, or other work. Extra allowances are generally paid geologists for work outside the United States.

Many geologists spend a great deal of time traveling and may be doing field work away from home for long periods of time. Their hours of work are uncertain because their activities in the field are affected by weather conditions as well as by travel.

### **Where To Go for More Information**

American Geological Institute,  
2101 Constitution Ave. NW., Washington 25, D.C.

Further information on positions in the Federal Government are given in the chapter Occupations in Government. (See index for page reference.)

## Geophysicists

(D.O.T. 0-35.65)

### Nature of Work

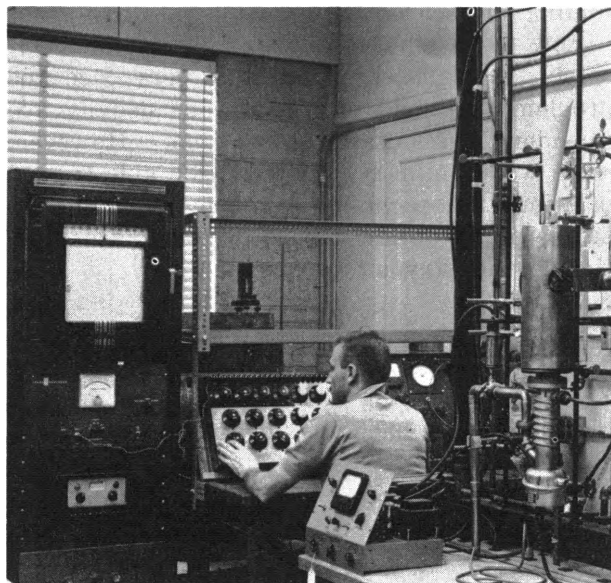
Geophysics is an overall term covering a number of sciences concerned with the composition and physical aspects of the earth—of its atmosphere and interior, as well as of the land and bodies of water on its surface and underground. Geophysicists utilize the principles and methods of physics, mathematics, engineering, geology, and chemistry in investigating and measuring the earth's forces—including magnetic, electrical, gravitation, radioactive, seismic (forces responsible for earthquakes), and geothermal forces (those resulting from the earth's interior heat and from solar radiation). In studying the earth's physical characteristics, geophysicists use highly complex precision instruments such as the seismograph, which measures the transmission of vibrations through the earth's interior; the magnetometer, which measures minute variations in the earth's magnetic field and the different ways this field is affected by various kinds of rocks; and the gravimeter, which measures minute variations in the pull of gravity.

*Exploration geophysicists*, sometimes known as prospecting geophysicists, are one of the largest groups of geophysical scientists. Employed chiefly in searching for oil and mineral deposits, most of these scientists serve as leaders or members of field parties, which may also include geologists, petroleum engineers, and other workers. Some exploration geophysicists conduct research aimed at developing new techniques and instruments for prospecting or improving existing ones.

Another sizable group of geophysical scientists are *hydrologists*, who study the surface and underground waters in the land areas of the earth. Some hydrologists work on such projects as water supply for cities, irrigation, flood control, and soil erosion. Others specialize in studies of sedimentation in river beds, reservoirs, and harbors. Still others are concerned with glaciers, snow surveys, the use of permanently frozen land areas, and forecasting the flow of rivers. (Hydrology is often con-

sidered a branch of geology and is also discussed in the preceding statement on Geology.)

Other smaller groups of geophysical scientists include oceanographers, seismologists, geodesists, geomagneticians, tectonophysicists, and volcanologists. *Oceanographers* are a small but rapidly growing group, who study the ocean in all its aspects, including the sea bottom, the shores, the water itself, and the interaction between the sea and the atmosphere. Those concerned with physical oceanography study such matters as currents, tides, waves, and the physical properties of sea water. Geological oceanographers are concerned with the topographic features of the continental shelves and ocean bottom, and with the sediments and rocks that are found there. Marine biologists, who study the life in the sea, are sometimes classified as oceanographers, although they are not geophysicists. *Seismologists* study the vibrations of the earth caused by earthquakes or manmade explosions. They may provide information for use in designing bridges and buildings in earthquake regions, work as prospecting geophysicists in exploration for oil and min-



Courtesy of U.S. Geological Survey

*Geophysicist measuring specific heat of minerals using a low-temperature calorimeter.*

erals, or explore the problems involved in detecting underground nuclear explosions. *Geodesists* measure the size and shape of the earth; determine the position and elevation of points on the earth's surface, chiefly for use in mapping large areas; and determine variations in the direction and force of gravity over the earth's surface. *Geomagneticians* specialize in measurements of the strength and direction of the earth's magnetic field, for use in navigation and surveying. They are also concerned with variations in the magnetic field and how these are related to sunspots and other solar phenomena; with the conditions affecting radio signals; and with many aspects of space science. *Tectonophysicists* study the structure of mountains and ocean basins, the properties of the materials forming the earth's crust, and the physical forces that cause movements and changes in it. A few geophysical scientists known as *volcanologists* are concerned with the origin, location, and activity of volcanos and hot springs, and with heat processes in the earth and similar phenomena.

Meteorology is another specialty which is usually classified as a geophysical science. However, this specialty is discussed in a separate statement (immediately following this one), since it represents a separate field of training and employment.

### Where Employed

The number of geophysicists in this country in 1960 was estimated to be approximately 6,000 (not counting meteorologists). This figure includes not only people with the title of geophysicist, most of whom are engaged in exploration, but also hydrologists, seismologists, geodesists, and other geophysical specialists.

A majority of all geophysicists work for private industry—chiefly in the petroleum industry. Geophysicists also work for mining companies and for exploration and consulting firms. A few are in business for themselves as consultants. Geophysicists in private industry are employed mainly in the southwestern and western sections of the United States, where most of the country's large oil fields and mineral deposits are located, although many work

in foreign countries where American firms are carrying on prospecting activities.

The Federal Government employs geophysicists, chiefly in the Coast and Geodetic Survey, the U.S. Geological Survey, and the Navy Hydrographic Office. Some geophysical scientists are employed in colleges and universities. In addition, relatively small numbers work for State governments and for private research institutions.

### Training and Other Qualifications

Degrees in geophysics are awarded by only a few colleges and universities. Many students planning to enter this relatively new field major in geology, physics, mathematics, chemistry, or engineering, or a combination of these subjects, as did many present members of the profession.

Training leading to a bachelor's degree in geophysics may be obtained in only about 16 institutions. These undergraduate programs provide training chiefly in exploration geophysics, though the curriculums may have other titles, such as geophysical technology or geophysical engineering. Some students take undergraduate training in exploration geophysics at colleges offering degree programs in engineering geology or petroleum geology. Other students prepare for exploration work by taking a combination of courses in geology, engineering, mathematics, and physics.

Graduate training is usually required for geophysical specialties other than exploration geophysics, and is becoming increasingly important in competing for the more desirable positions in exploration work. The doctor's degree is generally required for teaching careers and is frequently needed for positions involving fundamental research.

A student wishing to obtain a graduate degree in geophysics must attend one of the few institutions offering advanced training in the science. Only about 14 colleges and universities award the master's degree and 9 institutions, the doctor's degree in geophysics. The student should select a school which not only offers subjects of interest to him but also opportunities to carry out research projects in the partic-

ular aspects of geophysical science in which he is interested. For admission to these schools, students must have a bachelor's degree with a good background in geology, mathematics, physics, or engineering, or a combination of these subjects; an undergraduate major in geophysics is seldom required.

New graduates with bachelor's degrees who are hired for geophysical work in industry or government are usually given on-the-job training in the application of geophysical principles to their employers' projects. If a new employee's college work did not include courses in geophysics, he is taught geophysical methods and techniques as part of his on-the-job training.

Federal Government agencies provide summer jobs for a few promising undergraduates. Trainees gain practical experience on these jobs and, after graduation from college, may obtain permanent positions with the employing agency. Also, Federal Government agencies select a few of their geophysicists each year and send them to universities for graduate training.

The prospective geophysicist needs an aptitude and interest in mathematics and the physical sciences. He should have considerable physical stamina and be willing to travel, since geophysicists often have to work outdoors and explore remote areas of the earth.

### Employment Outlook

Good employment opportunities are expected through the mid-1960's for the relatively few graduates with degrees in geophysics—especially for those with master's or doctor's degrees.

Small numbers of openings for geophysicists are anticipated in the near future in several different fields of employment. Federal Government agencies anticipate having 40–50 openings each year for geophysicists, though the exact size of their staffs will depend on the appropriations voted by Congress. The petroleum industry probably will hire a few scientists with degrees in geophysics for exploration work. In previous years, this industry employed large numbers of people in geophysical work, many of them with degrees in other sciences. However, American companies were doing relatively

little exploration for oil either in this country or abroad in 1960, and only a small increase in oil exploration activities is anticipated during the mid-1960's. Mining companies are expected to hire some additional geophysicists to search for mineral deposits. Colleges and universities will probably offer only limited employment opportunities for geophysical scientists. The number of students majoring in geophysics dropped between 1959 and 1960. Unless the number starts rising again, there will be a few new teaching positions during the mid-1960's in institutions of higher education. Furthermore, some geophysicist positions will become vacant as a result of deaths and retirements, although these openings will not be numerous in the near future since geophysicists are a relatively young group.

It is also expected that the number of new geophysics graduates will continue to be small during these years. In 1959, only 132 degrees in geophysics were granted—64 bachelor's, 44 master's, and 24 doctor's degrees—according to the U.S. Office of Education. Although some people with training in other fields will probably continue to come into the profession, employers now indicate a preference for people with geophysical training for the available geophysical positions. Thus, the small number of graduates with degrees in geophysics should have favorable employment opportunities.

Over the long run, growth in the profession is expected. There will be increasing use of petroleum and mineral products by a growing population. As natural resources located at or close to the surface of the earth become depleted, more exploration geophysicists will be hired by petroleum and mining companies to find new sites of fuels and minerals at greater depths under ground or under water. In addition, the growing importance of basic research in the geophysical sciences, as well as the continuing need to develop new geophysical techniques and instruments, will create a demand for personnel with advanced training in hydrology, oceanography, seismology, geodesy, and other geophysical specialties. Federal Government agencies probably will have larger staffs to study the problems of the Nation's water supplies; work on flood control; do research in

radioactivity and cosmic and solar radiation; and explore the outer atmosphere and space, using such vehicles as sounding rockets and artificial satellites.

Few women are employed as geophysicists. Opportunities for women are and will be limited in field exploration because of the strenuous nature of the work. However, a small number of well-qualified women will be able to find positions in offices and laboratories or as teachers in colleges and universities.

### Earnings and Working Conditions

New graduates with bachelor's degrees could enter geophysical work in the Federal Government at either \$5,335 or \$6,345 a year in early 1961, depending on their college records. Those with master's degrees could start at \$6,345 or \$6,435, and those with the Ph. D. degree at \$7,560 or \$8,955. Some geophysicists in supervisory positions were earning \$12,000 a year, and a few in high-level posts had higher salaries.

Geophysicists working for private industry have somewhat higher earnings than those employed by Federal agencies. Salaries in educa-

tional institutions are usually lower than in private industry or in the Federal Government, but university teachers have the advantages of long summer vacations during which they can do consulting, writing, or research work. Geophysical scientists working outside the United States usually receive extra bonuses and allowances.

Geophysicists, particularly those in beginning jobs, often have to be away from home for long periods of time. Their working hours are usually irregular and are frequently determined by travel, weather conditions, and the requirements of field activities.

### Where To Go for More Information

American Geophysical Union,  
1515 Massachusetts Ave. NW., Washington 5, D.C.  
Society of Exploration Geophysicists,  
Box 1536, Tulsa 1, Okla.

Further information on positions in the Federal Government is given in the chapter on Occupations in Government. (See index for page reference.)

## Meteorologists

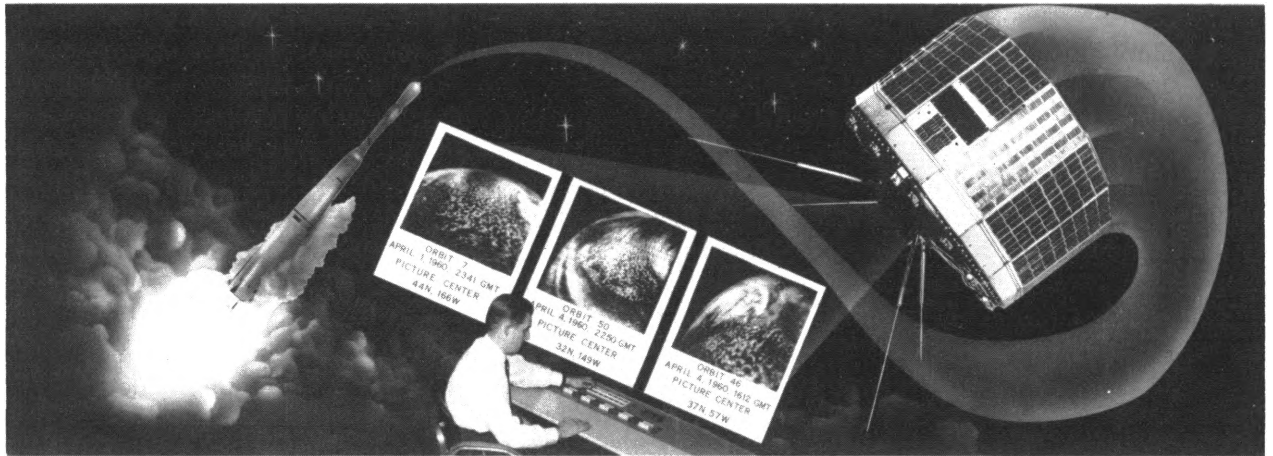
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### Nature of Work

Meteorology is the science of the atmosphere. Its aim is the understanding of the physical processes which produce the "weather." Weather forecasting is the best-known application of the science and the type of work in which most meteorologists are engaged. However, members of the profession are concerned also with many other types of problems, ranging from research on atmospheric data gathered in outer space by earth satellites to the effect of day-to-day temperature changes on retail sales.

Weather forecasters are technically known as *synoptic meteorologists*. They interpret current weather information—air pressure, temperature, humidity, wind velocity—reported by observers in many parts of the world and make short- and long-range forecasts for given re-

gions. Smaller numbers of meteorologists are specialists in other branches of the profession. *Climatologists*, for example, analyze past records on wind, rainfall, sunshine, temperature, and other aspects of climate for a given area and use this information for many purposes, including the improvement of long-range weather forecasting, and the planning of military and business operations. *Dynamic meteorologists* investigate the physical laws governing air currents. *Physical meteorologists* study the chemical composition and electrical properties of the atmosphere; the solar radiation; the effect of the atmosphere on the transmission of light, sound, and radio waves; and the factors affecting the formation of clouds, precipitation, and other weather phenomenon. Specialists in applied meteorology, sometimes called *industrial meteorologists*, are concerned with the effect of



Courtesy of U.S. Weather Bureau

*Photographs from cameras in earth satellite provide research meteorologists with data on atmospheric conditions.*

weather on specific human activities, biological processes, and industrial operations. For example, they make special forecasts for individual companies, attempt to induce rain or snow in a given area through cloud seeding, and work on such problems as smoke control and air pollution.

Growing numbers of meteorologists are engaged in research on such subjects as the properties and dynamics of the upper and high atmosphere (including the ionosphere) and space, using data obtained from rockets, guided missiles, and earth satellites. Investigations are also being conducted on the meteorological aspects of radio propagation, aurora and air glow, and cosmic rays. In addition, research is being conducted on long-range forecasting, severe weather phenomena, solar heating, and other problems.

Meteorologists who teach in universities or colleges may also engage in research or act as consultants. In colleges without separate departments of meteorology, they may teach subjects such as geography, mathematics, physics, and geology, as well as meteorology.

### Where Employed

More than 6,000 meteorologists were employed in the United States in 1960. Of these, approximately 2,800 were on active duty in the Air Force, and several hundred were in the Army, Navy, and Marine Corps. Meteorologists on active duty are usually engaged in weather

forecasting for military operations. The Armed Forces also employed more than 200 civilian meteorologists in 1960, chiefly in research work.

The United States Weather Bureau is by far the largest employer of civilian meteorologists. In 1960, approximately 1,700 meteorologists worked at 300 stations maintained by the Bureau in all parts of the United States, the polar regions, Puerto Rico, Guam, and other sites in the Pacific area. A few meteorologists were employed by other Government agencies, such as the Forest Service of the Department of Agriculture, the Department of the Interior, the Federal Aviation Agency, and the National Aeronautics and Space Administration.

Aside from the Federal Government, the largest fields of employment for meteorologists are commercial airlines, educational institutions, and weather consulting services. In 1960, the airlines employed about 300 meteorologists to forecast the weather along the companies' flight routes and to brief pilots on weather conditions. Colleges and universities employed another 300. Private weather consulting firms, which contract their services to individuals and companies, employed more than 150. In addition, some meteorologists were working for companies that design and manufacture meteorological instruments, as well as for a number of large companies in the aircraft, insurance, utilities, and other industries. A few meteorologists present radio and television weather programs or work as editors and librarians.

There are not many women meteorologists. Some work as forecasters for the Weather Bureau, and a few others are on active duty in the Air Force. Another small group are employed by colleges and universities, primarily in research positions. A very small number work for commercial airlines.

### **Training and Other Qualifications**

A B.S. degree, with a major in meteorology or a related science, is the usual minimum educational requirement for young people wishing to become meteorologists. Courses in physics and mathematics, in addition to meteorology, are important. For example, the Weather Bureau's minimum requirement for its beginning positions is a bachelor's degree, with at least 20 semester hours of study in meteorology and, in addition, training in physics and mathematics. Airlines, which until recent years hired many meteorologists without college degrees, are now giving preference to those with bachelor's degrees. They are also looking for meteorologists with training in upper air analysis, as well as with the knowledge needed to work with the increasingly complex data issued by the Weather Bureau. New graduates with only the bachelor's degree are hired mainly for work in weather forecasting. Positions in the more specialized branches of the profession, in teaching, and in research usually require advanced training in meteorology, physics, and mathematics, and also in chemistry.

Degrees in meteorology were awarded by only 17 colleges and universities in 1960. However, many other institutions offer courses in meteorology which, if combined with sufficient training in physics and mathematics, may serve as adequate preparation for most professional entry positions.

Meteorological training is also made available to qualified persons in the Armed Forces. Each year, the U.S. Air Force selects and sends more than 150 college graduates who have received commissions through the Air Force Reserve Officers Training Corps (AFROTC) to civilian universities for a special 1-year program in meteorology. Those who complete this program are assigned to meteorological work. Each year,

the U.S. Air Force also sends about 50 military meteorologists to universities for advanced training leading to the master's or doctor's degree. Ex-servicemen with military training and experience as meteorologists are given preference for civilian positions with the Armed Forces and can also qualify for positions with other employers of weather personnel.

The Weather Bureau has an in-service training program. Each year scholarships are granted to some of its meteorologists to enable them to take advanced and specialized training. It also conducts a student-trainee program. College students preparing for careers in meteorology may obtain summer jobs with the Weather Bureau, where they may get regular positions after they receive their bachelor's degrees.

Promotions in the Weather Bureau, as in other Federal Government agencies, are given according to Civil Service regulations. (See chapter Occupations in Government.) With the airlines, the chances for advancement are limited. However, after considerable work experience, some meteorologists in the largest airline companies may advance to the position of flight dispatcher, or to various supervisory or administrative positions. Some well-trained meteorologists with a background in science, engineering, and business administration may find their best opportunities for advancement in the profession through the establishment of their own weather consulting services.

Among the personal characteristics needed by meteorologists are mathematical aptitude and an interest in the physical sciences. For some jobs, the ability to draw quickly and neatly is important. Since most of the work is done in an office, unusual physical stamina is seldom required.

### **Employment Outlook**

Employment opportunities for meteorologists will probably be very good during the mid-1960's. The coming of the "space age"—the age of supersonic aircraft, rockets, and space travel—is broadening the scope of the science. The demand for meteorologists is increasing with the growing awareness, in both govern-

ment and private industry, of the value of accurate weather information and with the continued expansion of meteorological research programs.

In 1960, the Weather Bureau was seeking new graduates and experienced men to fill vacancies in its weather forecasting services and to work on programs such as hurricane research, air pollution research, storm warnings, and flood forecasting. The Bureau anticipates further increases over the long run in its forecasting staff, since the continued expansion in civilian aviation will probably result in the building of new airports and weather stations. In addition, it is expected that opportunities for research will increase with the advent of meteorological satellites, and with a continuing growth in new research programs. The Bureau estimated that each year until 1965, and probably also until 1970, it would need more than 100 meteorologists with bachelor's or advanced degrees to fill new positions and to replace workers who resign, retire, or die.

Airlines also had openings for meteorologists and expected a continuous growth in their employment throughout the 1960's. With the introduction of jet aircraft, airlines have to solve complicated weather forecasting problems. They will probably hire increasing numbers of meteorologists to determine the routes and flight levels which will assure the safest and smoothest flights. Research on problems relating to high speed, high altitude jet aircraft will also require some exceptionally qualified airline meteorologists with advanced scientific knowledge.

Employment opportunities for meteorologists in weather consulting services and on the staffs of private companies are also expected to increase somewhat. More and more businessmen are utilizing weather and climate data in planning their operations. As the value of this information receives further recognition, the demand for industrial meteorologists will continue to grow.

In colleges and universities, opportunities for meteorologists are expected to rise over the next decade, with the anticipated increase in college enrollment, and as additional courses in meteorology are offered.

Opportunities for civilian meteorologists in

the U.S. Air Force were limited in 1960 and are not expected to increase significantly in the next few years. However, the U.S. Air Force anticipates a growing need for officers who are meteorologists during the early 1960's, when many of those now on active duty will reach retirement age.

Thus, all signs point toward growth in this profession. Since meteorology is a small profession, job openings will not be numerous in any 1 year. On the other hand, the number of new graduates with degrees in meteorology probably will continue to be small; in 1959, only 173 bachelor's, 88 master's, and 11 doctor's degrees were granted. Furthermore, graduates with majors in other fields such as physics and mathematics, and with some training in meteorology, have not been attracted into the profession because of the numerous opportunities open to them in other scientific fields. Military meteorologists, upon leaving the armed services, have in most instances left the profession altogether. Unless there is an unexpected change in these conditions, new meteorology graduates—women as well as men—seeking employment in the profession should have favorable employment opportunities through the mid-1960's at least.

#### **Earnings and Working Conditions**

In the Federal Government service, meteorologists with the bachelor's degree and no experience could start at either \$5,335 or \$6,345 a year in 1960, depending on their college records. Meteorologists with the master's degree could start at \$6,345 or \$6,435, and those with the Ph.D. degree at \$7,560 or \$8,955. Some meteorologists in supervisory positions were earning as much as \$12,000 a year, and a few received still higher salaries. Workers stationed outside the United States are paid an additional amount. The provisions for salary increase, paid vacations, sick leave, pensions, life and health insurance, and other benefits are the same for meteorologists as for other Civil Service employees. (See chapter Occupations in Government.)

Current data on the earnings of meteorologists in private industry are available only for



those with the airlines. In late 1960, airline meteorologists were receiving a starting salary of approximately \$500 a month, according to the Air Transport Association. The top salary for meteorologists in nonsupervisory positions in the United States was approximately \$800 a month; some stationed outside the United States were paid more. Supervisors had an average salary of approximately \$12,000.

Jobs in weather stations, which are operated on a 24-hour, 7-day week basis, often involve nightwork and rotating shifts. Most stations

are located at airports or other places in or near cities. However, some are in isolated and remote areas.

#### **Where To Go for More Information**

American Meteorological Society,  
45 Beacon St., Boston 8, Mass.

The U.S. Weather Bureau, Washington 25, D.C., will provide information on employment opportunities with that agency and on its student-trainee program.

# BIOLOGICAL SCIENCES

Biological scientists are concerned with the world of living things—men and microbes, wild and domestic animals, plants and insects, birds and fish. Some biological scientists collect basic information about plants and animals or do research to expand our knowledge about all living things. Others teach in colleges and universities. Still others apply biological knowledge to the solution of practical problems, such as the development of new strains of plants. Professional workers in several of these applied fields—foresters, soil scientists and soil conservationists—are discussed elsewhere in the Handbook. (See index for page number.)

## Nature of Work

Biological scientists study the structure of living organisms, their life processes, and the relation between these organisms and their environment. The number and variety of plants and animals are so vast and the life processes so varied and complex that biologists must, of necessity, become specialists. Some biologists spend an entire career trying to learn as much as possible about a particular kind of animal or plant. Others, interested in how an animal or human body functions, study such things as the nervous system, how food is digested, or the ways in which organisms are affected by disease. Some are interested in the evolution of living organisms, the mechanism of heredity, or the ways in which environmental factors, such as major changes in climate or radioactivity, affect the development of various plants or animals.

A large majority of the biological scientists are engaged in either college and university teaching or research, and many do both. Much of the research performed by biological scientists is basic research, aimed at adding to

our knowledge about living organisms regardless of whether such knowledge is of immediate practical use. For example, the biologists who developed a method for growing polio virus in living tissue, an essential step in the evolution of the Salk polio vaccine, knew that their work might eventually have some practical value, but their immediate purpose was to learn more about the way viruses act on living cells.

Research in the biological sciences may take many forms. It may be conducted inside a laboratory or outdoors, at the far corners of the world, or near a quiet university town. A botanist exploring the volcanic Alaskan valleys to see what plants live in this strange environment and a zoologist searching the jungles of the Amazon valley for previously unknown specimens of animals and fish are both doing research, as in an entomologist working in a laboratory testing various chemical insecticides for effectiveness and for possible hazards to human and animal life.

In each of these different types of research, the biologist must have at his command the fundamental techniques of biological and chemical research, such as skill in the use of microscopes and other laboratory equipment, in making and staining tissue sections, and in classifying and identifying specimens. In the experimental field, which includes microbiology, physiology, genetics, biochemistry, biophysics, and pharmacology, advanced techniques and tools taken from the field of chemistry or physics are frequently used. Also, because of the enormous number of variable factors involved, a knowledge of mathematical and statistical procedures is often needed to organize and analyze the data gathered.

Teaching in colleges and universities is the major function of a sizable number of biological scientists. However, college teachers of biologi-

cal sciences often combine independent research with their regular teaching duties and in some large institutions spend the major portion of their time on research.

Some biological scientists are engaged in management and administrative work. This may involve supervising and administering industrial, nonprofit, or governmental laboratories engaged in research or in testing foods, drugs, insecticides, and other products. Biological specialists act as liaison between the Federal Government and the experiment stations at the State universities, and aid in the planning, development, and evaluation of research programs at these stations.

Relatively small numbers of biologists are engaged in a variety of other types of work, such as consulting, writing, and routine testing. A few are employed in technical sales or field service work for industrial firms; such work includes, for example, teaching company salesmen and prospective purchasers the value and proper use of new chemicals when used as food preservatives or insecticides, or for other purposes.

Biological scientists may be classified into three broad groups characterized by the type of organism with which they work: Botanists (plant scientists), microbiologists, who work with micro-organisms, and zoologists (animal scientists). Some biological scientists, particularly those whose work cuts across more than one of these major groupings, as is frequently the case with college teachers, may call themselves simply biologists.

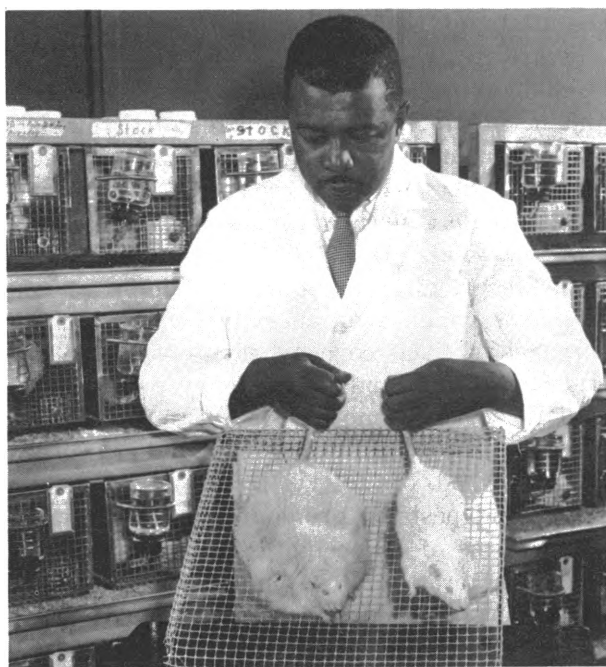
There are also a large number of specialties—some wholly within these major groupings, and others which cut across them. For example, some biological specialties relate to the specific type of organism studied, as in the case of mycologists (botanists who study fungi); others indicate the sort of approach used in studying organisms, as in the case of geneticists, who may be botanists, zoologists, or microbiologists studying the mechanisms of the heredity of a particular plant (such as sweet peas), animal (such as fruit flies), or micro-organism (such as molds).

Some biological scientists work in what may be considered the broad groupings of biology

and others work in what might be considered specialties. A description of the work of some biological scientists follows:

*Botanists* (D.O.T. 0–35.23) study all aspects of plant life. Some, known as plant taxonomists, specialize in identifying and classifying plants. Others are plant morphologists, who are primarily concerned with the structure of plants and plant cells; or plant physiologists, whose primary interest is in the life processes of plants and the ways in which they grow and reproduce; or specialists in still other phases of plant life.

*Microbiologists* (D.O.T. 0–35.33) specialize in the study of bacteria, viruses, molds, and other organisms of microscopic or submicroscopic size. They work with test tubes, cultures, microscopes, and a variety of other specialized laboratory equipment. The terms bacteriology and microbiology are sometimes used interchangeably, but microbiology, the broader term, is preferable when referring to the study of all microscopic organisms. It may include the study of medical problems through experiments with cells or other microscopic components of the body. Some microbiologists special-



Courtesy of National Institutes of Health

*Biological scientists use live animals in study of nutrition problems.*

ize in soil bacteriology (the study of bacteria, molds, algae, and protozoa and other microorganisms in soils, and the relation of such organisms to soil fertility). Others specialize in virology (the study of viruses which may cause diseases in animals or plants), immunology (the study of mechanisms by which the body fights off infection), or serology (the study of animal and plant fluids, including blood serums). Others specialize in the study of the fermentations involved in the manufacture of beer, wine, flax, tobacco, and leather, or in the search for new or better antibiotics. Many specialize in the testing and production of biological products or in the testing of water supplies, milk, or other foods, to control and prevent contagious diseases.

*Zoologists* (D.O.T. 0-35.28) study all phases of animal life—the origin, classification, life history, behavior, life processes, diseases and parasites, and the ways in which animals influence and are influenced by their environment. Some zoologists make field trips to study animals in their natural environment and to collect specimens. Others work mainly in laboratories, conducting experimental studies with animals. Zoologists who specialize in the study of certain classes of animals usually use titles which indicate the kind of animal studied; thus, ornithologists study birds and herpetologists study snakes; ichthyologists study fish; and mammalogists, mammals. Teachers and others whose work cuts across several of these fields generally use the title of zoologist.

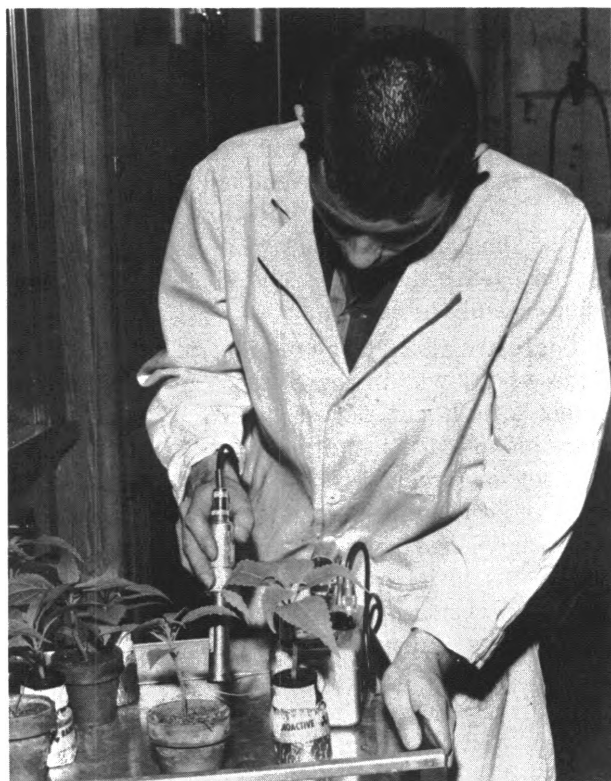
*Agronomists* (D.O.T. 0-35.01) are concerned with the growing, breeding, and improvement of plants which are generally grown in large acreages, such as corn, wheat, tobacco, cotton, and sugar cane and beets. They develop new varieties of crops more resistant to the hazards of weather, disease, and insects and search for better methods of growing crops and controlling weeds and pests. Agronomists may specialize in problems of a specific geographical area, a particular crop, or a technical specialty such as crop breeding or production methods.

*Anatomists* (D.O.T. 0-35.36) study the form and structure of organisms and the structure and organization of the specialized organs. They may study structures visible to the naked eye

or of microscopic size, or those of submicroscopic size, visible only through the use of the electron microscope. Many anatomists specialize in human anatomy. Others are comparative anatomists who study animal and plant species.

*Biochemists* (D.O.T. 0-07.02) use chemical methods to study the composition of biological materials and the mechanism of biological processes. They may conduct research on the chemical reactions involved in the functioning of living tissues, or the relationships of nutrients contained in food to plant and animal nutrition, digestion, metabolism, growth, health, and disease. (Biochemistry is often considered a branch of chemistry and is also discussed in the statement on Chemists. See index for page number.)

*Biophysicists* (D.O.T. 0-35.49), who are trained in both physics and biology, are concerned with the physical properties and relationships of living cells and organisms—including mechanics, heat, light, radiation, sound, electricity, and energetics. They may use the electron microscope to make tissues visible



*Botanist studying effect of radiation on plants.*

down to their smallest units, the molecules, or they may use nuclear reactors, X-ray machines, microscopes, and photomicrographic apparatus to study the effect of high energy radiation on cells and tissues.

*Embryologists* study the development of an organism from the time of fertilization of a single cell until it becomes a complete organism, animal, or plant. They study the physiological and biochemical mechanisms which control and direct the processes of development and the ways in which this control is accomplished.

*Entomologists* (D.O.T. 0-35.30) study the classification, anatomy, physiology, and behavior of insects, and the ways in which they affect human beings, other animals, and plants. Some entomologists specialize in identifying and classifying insects—an enormously difficult undertaking, since there are more than 80,000 species of insects in the United States and Canada alone. Proper identification of insects is basic to their control and thus to the preservation of food supplies and the control of insect-borne disease. Many entomologists do research on methods of insect control through the use of chemicals, birds, other insects, biological methods such as insect diseases, or mechanical means. Others study ways of utilizing beneficial insects such as honey bees, which not only produce valuable quantities of honey and wax, but are also an essential species in the pollination of crops so that they will mature, yield good harvests, and produce viable seed.

*Geneticists* (D.O.T. 0-35.35) specialize in the study of factors of heredity—the way in which various biological characteristics are transmitted from one generation to another. Geneticists interested primarily in the improvement of plant and animal breeds of economic importance—such as cereal or tobacco crops, dairy cattle, or poultry—may be classified as plant or animal breeders, agronomists, or animal science specialists. Theoretical geneticists search for the fundamental laws of heredity and the mechanisms which produce heritable traits in plants, animals or humans.

*Horticulturists* (D.O.T. 0-35.05) deal with orchard and garden plants such as fruits, nuts,

vegetables, flowers and ornamental plants, and nursery stock. They develop new or improved plant varieties and try to find better methods of growing, harvesting, and storing horticultural crops. Horticulturists usually specialize in some specific vegetable, flower, or fruit or in a particular technical problem, such as plant breeding or cultural practices.

*Husbandry specialists* (animal) (D.O.T. 0-35.13, .14, and .15) carry out investigations and experiments on breeding, feeding, and management of cattle, hogs, sheep, poultry, and other domestic animals, and in diseases of animals and poultry. They may specialize in problems of feeding and nutrition, of breeding and genetics, or of animal physiology.

*Nutritionists* study the processes through which human beings and animals utilize food; the kinds and quantities of food elements, such as minerals, vitamins, fats, sugars, and proteins, which are essential to maintain the best state of health; how these food elements are transformed into body substances; and what role food elements have in body processes and functions. Nutritionists also analyze foods to determine their composition in terms of essential food elements.

*Pathologists* study the causes and processes of disease, degeneration, and abnormal func-



Courtesy of National Institutes of Health

*Pharmacologists* develop new drugs for treatment of disease.

tioning in human or animal organisms. They may specialize in the study of the effects of diseases, parasites, and insect pests on organs and tissues; in histology, which is the microscopic study of animal and plant tissues; or in the structure or anatomy of diseased organs. They also study the chemistry and physiology of tissues to see whether they are abnormal and if so, in what way. The term "pathologist" is normally reserved for students of human pathology (medical pathology); specialists in animal pathology are usually veterinarians. Those who study plant diseases may be called plant pathologists or phytopathologists. Their work is discussed under the heading "phytopathologists."

*Pharmacologists* (D.O.T. 0-35.34) are concerned primarily with the study of how drugs affect life processes, and with the discovery and development of new chemical compounds which will have certain desired effects on organisms. They conduct experiments with rats, guinea pigs, monkeys, and other animals to determine the physiological effects of drugs, gases, dusts, poisons, and chemicals on the tissues and organs of living creatures, and correlate their studies with clinical medical data on the effects of such substances on human beings.

*Physiologists* (D.O.T. 0-35.13) study the functioning of organisms during life and how life processes operate. They may specialize in the study of the heart, circulatory system, glands, nerves, cellular activities, or digestive, excretory, reproductive, or other systems. They conduct experiments to determine the effects of environmental factors on life processes. The knowledge gained in such studies provides the basis for the work of many other specialists, such as pathologists, pharmacologists, or nutritionists.

*Phytopathologists* (D.O.T. 0-35.26) or plant pathologists specialize in the causes and control of plant diseases produced by parasitic organisms, viruses, chemicals, and other agents. Some specialize in the pathology of a specific plant or group of plants, such as forest trees, vegetable crops, ornamental plants, and field crops. Others work only with certain organisms or groups of organisms affecting plants, such as fungi, viruses, or bacteria.

### Where Employed

About 95,000 biological scientists were employed in the United States in mid-1960. About half of all biological scientists are employed by colleges and universities. Approximately one-third are employed by government agencies—Federal, State, and local—and about 10 percent by private industry. Another small number are in independent commercial laboratories and nonprofit organizations, mainly hospitals, clinics, and privately financed research organization or foundations. A few are self-employed.

The biologist's specialty largely determines the type of organization he will work for. For example, more than two-thirds of those specializing in anatomy, ecology, physiology, zoology, and botany, and a majority of biologists in most other specialties are employed in colleges and universities, according to the National Science Foundation's Register of Scientific and Technical Personnel. Government agencies—Federal, State, and local—are the principal employers of entomologists, and fish and wildlife biologists. Biological scientists specializing in agronomy, horticulture, animal husbandry, entomology, or other subjects related to agriculture are employed chiefly in State agricultural colleges and universities and in agricultural experiment stations operated by these universities in cooperation with the Federal and State Governments. Many research opportunities for teachers and students, both full- and part-time positions, are provided in agricultural experiment stations. Teachers specializing in other biological sciences, particularly those important to medicine, are most often employed in liberal arts institutions and in medical schools.

The Department of Agriculture is the principal Federal Government agency employing biological scientists. It employs the most entomologists, botanists, plant physiologists, plant pathologists, horticulturists, geneticists, animal husbandry specialists, and parasitologists. The Interior Department employs nearly all the fish and wildlife biologists in the Federal Government. The Defense Department—mostly the Army—and the National Institutes of Health of the Department of Health, Education, and Welfare employ a good many pharmacologists,

parasitologists, physiologists, entomologists, microbiologists, and specialists in other branches of biology.

State Governments employ about half of all the fish and wildlife specialists, and some microbiologists, entomologists, zoologists, phytopathologists, and pathologists. City and county health departments employ a good many microbiologists to detect, control, and prevent disease.

Private industry is the second largest employer of biochemists, microbiologists, nutritionists and pharmacologists and is a growing source of employment for agronomists, entomologists, and phytopathologists as well as other biological scientists. Most of the microbiologists and nearly all the pharmacologists in private industry work for pharmaceutical firms. However, some firms manufacturing food products, tobacco, leather, organic acids, and other industrial products also employ microbiologists. Entomologists are employed mainly in the food industry, to develop methods of protecting stored foods from insect pests, and in the chemical industry, to do research in developing and testing insecticides. Phytopathologists are most often employed by firms manufacturing agricultural chemicals to combat plant diseases.

Relatively few biological scientists are women—about 10 percent, according to the National Science Foundation's 1960 Register. The largest number of women scientists specialize in microbiology. Smaller numbers of women specialize in nutrition, botany, and physiology.

### **Training and Other Qualifications**

Young people seeking professional careers in the biological sciences should, if possible, obtain an advanced degree—preferably a Ph. D.—in their field of interest. Although the bachelor's degree with a major in one of the biological sciences is adequate preparation for some jobs, promotional opportunities for biologists without graduate training are usually limited to intermediate level positions.

The Ph. D. degree is generally required for full professional recognition and, specifically, for higher level college teaching positions and for basic research in experimental biology. It is

also necessary for an increasing number of other positions involving independent research.

Biologists with master's degrees are qualified for most entry positions in their specialties and for some types of positions in college teaching and basic research. Most biologists with this level of education work in colleges and universities or in government agencies.

New graduates with bachelor's degrees can qualify for positions involving inspection and testing, production and operation work, technical sales and service, and administrative duties in connection with the enforcement of government regulations. Those who graduate near the top of their class may also have opportunities to do research, although mostly of a routine nature or under close supervision. Persons with bachelor's degrees may also obtain positions as senior technicians, particularly in the area of medical biology. Furthermore, some new graduates with bachelor's degrees take courses in education and choose a career as a high school teacher of biology rather than as a biological scientist. (See statement on Secondary School Teachers.)

Undergraduate students interested in professional careers as biological scientists are advised to obtain the broadest training possible in all branches of biology and in related sciences, including organic and inorganic chemistry, physics, and mathematics. Highly important also are extensive training and practice in laboratory techniques, in the use of laboratory equipment, and in field work. Students interested in experimental research in biology need advanced training in chemistry, mathematics, statistics, and, in some cases, physics.

Most colleges and universities offer an undergraduate major in biology or in one of the biological or agricultural specialties. However, the courses offered differ greatly from one college to another and students should find out ahead of time, by studying the catalogues, which college program will best fit their interests and needs. In general, liberal arts colleges and universities emphasize training in the basic biological sciences and in the medical aspects of biological science. State universities and land-grant colleges offer special advantages to those interested in agricultural sciences and in ento-

mology, since their agricultural experiment stations provide many opportunities for practical training and research work.

Advanced degrees in the biological sciences are awarded by a large number of colleges and universities. In graduate school, the student builds upon the broad background in the fundamentals of biology and related sciences acquired in his undergraduate study, placing major emphasis on his specialty or field of interest. Requirements for the master's or doctor's degree usually include field work and laboratory research, as well as classroom studies, library research, and preparation of a thesis.

### Employment Outlook

Employment opportunities for biological scientists with graduate degrees are expected to be very good in both the near future and the long run. Employment opportunities are also likely to be good for persons with bachelor's degrees who graduate near the top of their class, particularly in the fields of entomology, fish and wild life biology, and microbiology.

An increased demand is expected for biological scientists in most specialties, but there will be particular demand for those with doctorates in biophysics, microbiology, physiology, pharmacology and virology to do research in problems important to medicine. This research will also require many more biologists with bachelor's and master's degrees qualified to act as junior professional assistants and technicians. There will also be a need for additional scientists with advanced degrees in microbiology, plant science, and entomology for research positions in the agricultural science areas. Furthermore, college teachers in nearly all biological specialties will be needed.

One of the major factors which will tend to increase employment of biological scientists is the anticipated growth in research expenditures. In recent years, the Federal Government has greatly increased its support of research in the biological (and agricultural) sciences; through the National Institutes of Health, the U.S. Department of Agriculture, the National Science Foundation, and the U.S. Department of Defense. Further growth is expected during the

next decade, particularly in such relatively new areas as space biology (research aimed at solving the problems associated with the survival and proper functioning of men in space) and radiation biology (the study of the effects of high energy radiation on the human body). Voluntary health agencies, such as the cancer, tuberculosis, and heart societies, also are giving increased support to basic biological research. Furthermore, additional research will probably be conducted in the agricultural science fields, particularly plant disease and insect control.

Research activities in industry are also expected to rise. In particular, microbiological research has great potentialities and the recent trend toward increased expenditures for research and development activities in microbiology is likely to persist. The more stringent health standards, established by Congress and the Federal regulatory agencies, which will probably require additional industrial research and testing before new chemicals and new processing methods may be used in agriculture and food processing, are also expected to be a factor in the increased demand for biological scientists.

Still another factor which will tend to increase employment of biological scientists will be the substantially larger college and university enrollments expected in the mid-1960's and thereafter. The resulting rise in demand for teachers will be to a large extent for Ph. D.'s. However, there will also be a large increase in college openings for qualified people holding master's degrees.

### Earnings and Working Conditions

In the Federal Government, the annual starting salary for inexperienced biological scientists with the bachelor's degree was either \$4,345 or \$5,355 in 1960, depending on the individual's college record. Inexperienced biologists with 1 year of graduate training could start at \$5,355, and those with 2 years of graduate work at \$6,435. Biological scientists with the Ph. D. degree could start at \$7,560 or \$8,955. Pharmacologists received higher starting salaries; those with bachelor's degrees could begin at \$5,335 or \$6,345 a year, and those with 1



year of graduate training at \$6,345. Pharmacologists with 2 years of graduate training and those with the Ph. D. degree had the same starting salaries as other biological scientists.

Information on beginning salaries of biological scientists employed as college and university teachers is not available. However, some indication of their salary levels may be obtained from the salary figures for college and university teachers as a group. This information is presented in the statement on College and University Teachers. (See index for page number.) In addition to their regular salaries, many biologists in educational institutions obtain income from other sources, such as consulting work and special research projects.

The average (median) salary of experienced biological scientists in all types of employment was \$8,000 a year in 1960. In general, experienced biological scientists in private industry tend to have higher salaries than those in other types of employment. For example, the median annual salary of biological scientists was about 25 percent greater in private industry than in either Federal Government employment or colleges and universities, according to the 1960

Register. Within a particular field of employment, holders of Ph. D. degrees usually earn considerably more than those with bachelor's or master's degrees.

Biologists can usually look forward to an increase in salary as they gain experience. According to the 1960 Register, the average (median) salary of biologists with 2 to 4 years of experience was \$6,000 a year. Biologists with 20 or more years of experience averaged about \$11,000, and 10 percent of them made \$17,000 or more a year.

#### **Where To Go for More Information**

American Institute of Biological Sciences,  
2000 P St. NW., Washington 6. D.C.

Federation of American Societies for Experimental  
Biology,  
9650 Wisconsin Ave. NW., Washington 14, D.C.

Office of Personnel, U.S. Department of  
Agriculture,  
Washington 25, D.C.

Employment Officer, U.S. Department of Health,  
Education, and Welfare,  
National Institutes of Health, Bethesda 14, Md.

# MATHEMATICS AND RELATED FIELDS

Mathematics is both a profession and a tool subject essential for many kinds of work. This chapter includes descriptions of the mathematics profession and two other closely related professions—statisticians and actuaries. For entrance into any of these three fields, college training in mathematics is required. For many types of work, graduate training in mathematics is necessary.

In addition to the professions covered in this chapter, many others utilize mathematics extensively in performing their jobs. These professions—which include engineers, chemists, physicists, astronomers, and other scientists—are described elsewhere in the Handbook. High school teachers of mathematics are not covered in this chapter, but are included in the statement on Secondary School Teachers.

## Mathematicians

(D.O.T. 0-35.76)

### Nature of Work

Mathematics is one of the oldest and most basic fields of science. It is also one of the most dynamic and rapidly growing professions. Mathematicians today are engaged in a wide range of activities, including research on the behavior of the atom, calculating orbits of earth satellites, and translating business and scientific problems into mathematical terms for solution by electronic computers.

Mathematical work may be divided into two broad classes—pure or theoretical mathematics and applied mathematics, which includes mathematical computation. Theoretical mathematicians are concerned with the logical development of mathematical systems and the study of the relations among various mathematical forms. In a sense, pure mathematics is an art and pure mathematicians are simply attempting to advance the art. They seek to increase basic mathematical knowledge without necessarily considering how this knowledge may be used. However, many scientific and engineering achievements have resulted from the development and application of this pure and abstract mathematical knowledge. For example, a seemingly impractical non-Euclidean geometry invented in 1854 by Bernhard Riemann

was to become an integral part of Albert Einstein's theory of relativity developed more than a half century later.

Mathematicians engaged in applied work develop mathematical techniques and approaches to solve problems in the physical, biological, and social sciences. They analyze each problem and attempt to describe it in terms of a mathematical system. Mathematicians doing this kind of work need not only competence and imagination in mathematics, but also knowledge of the field in which they are working. Applied and pure mathematics are not always sharply separated in practice. Many important developments in theoretical mathematics have arisen directly from practical problems. For example, differential calculus was developed by Isaac Newton to describe and analyze the velocity and acceleration of moving objects—something which could not be done satisfactorily by earlier systems of mathematics.

An important part of the work in applied mathematics involves utilizing mathematical knowledge and modern computing equipment, ranging from desk calculators to complex electronic computers, to obtain numerical answers to specific problems. Although such work often

requires a very high level of mathematical knowledge and skill, many positions in this field—for example, those of programmer and coder for digital computers—do not require the advanced training and inventiveness needed in other types of mathematical work. Much of the mathematical work connected with scientific research and development, as well as statistics and business, is of this type.

**Where Employed**

More than 30,000 mathematicians, including over 3,500 with Ph. D. degrees, were employed in the United States in mid-1960. Relatively few mathematicians are women—less than 10 percent, according to the National Science Foundation's 1960 National Register of Scientific and Technical Personnel.

The largest number of mathematicians—more than two-fifths of the total—are employed by private industry. Almost as many—slightly less than two-fifths of the total—are employed by colleges and universities. Most of the remainder are employed by Government agencies, chiefly the U.S. Department of Defense, the National Aeronautics and Space Administration, and the U.S. Department of Commerce; by foundations and other nonprofit organizations; and by independent commercial laboratories.

Major industrial employers of mathematicians are the electrical equipment and the aircraft and missile industries. The machinery, chemicals, fabricated metal products, and petroleum industries also utilize significant numbers of mathematicians. These six industries accounted for more than two-thirds of all mathematicians employed in private industry in 1960.

**Training and Other Qualifications**

A bachelor's degree with a major in mathematics is the minimum educational requirement for entrance into this field. For many mathematical positions, particularly in research and teaching, graduate training is required.

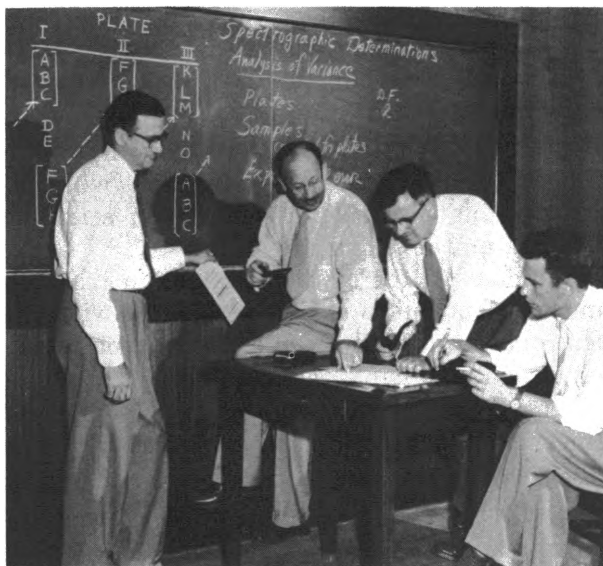
In both industry and government, advanced degrees are required for an ever-increasing

number of jobs, in research and in many other areas of applied mathematics. The Ph. D. degree is necessary for most high-level college and university teaching positions and for the more advanced research work, such as formulating mathematical theories to describe an engineering or scientific situation.

The bachelor's degree is adequate preparation for many positions in either private industry or the Federal Government, particularly those connected with computer work. Some new graduates with only the bachelor's degree become graduate research or teaching assistants in universities while working toward advanced degrees. However, an advanced degree is generally required for advancement to the more desirable teaching or research positions.

For teaching and work in applied mathematics, training in the field to which mathematics is to be applied is important. For many applied mathematicians, the fields of application are physics and engineering. Other fields of application include business and industrial management, economics, statistics, chemistry, and biology. For research and teaching in pure mathematics, however, training in a specific field of application is seldom required.

The development in recent years of high-speed electronic computers has brought a grow-



Courtesy of National Bureau of Standards

*Mathematicians often work with other scientists to develop statistical designs for experiments.*

ing need for mathematicians particularly qualified to work with these machines. Knowledge of numerical analysis is especially desirable for this work. Preparing the detailed instructions or program to guide the computer also calls for special training, as described in the statement on Programmers. (See index for page number.)

Among the personal qualifications needed by mathematicians are a keen logical mind, imagination, intellectual curiosity, and a desire to analyze and solve new and difficult problems. Mathematicians must also be able to express themselves clearly and concisely in order to present mathematical ideas to scientists, engineers, and others who use mathematics but are not mathematicians.

### Employment Outlook

The outlook is for continued rapid growth of employment in mathematics, both in the near future and over the long run. As in recent years, there will be a particular demand for mathematicians with Ph. D. degrees—for research, teaching, and many applied mathematics positions.

One of the major factors which will tend to increase employment of mathematicians is the anticipated rise in scientific research and development activities, in which more than one-third of all mathematicians are engaged. Total expenditures for research and development have increased rapidly in recent years, rising from \$5.4 billion in 1953 to more than \$13 billion in 1960–61. In all probability, both private industry and the Federal Government will continue to increase their spending on scientific research and development.

The demand for mathematicians in research and development is closely associated with the development of high-speed electronic computers which make possible the solution of a steadily widening variety of complex physics and engineering problems in such fields as operations research, logistics (the transport, quartering and supply of military personnel), inventory control, and scientific management. High-speed electronic computers have also opened broad new fields of application for mathematics in business management. These computers pro-

vide needed accounting and other data very rapidly and make possible analyses of business operations which often were not practicable with less advanced equipment.

The demand generated by these computers is for people who can apply mathematics to specific problems, not simply for mathematicians as such. Undoubtedly, a part of this demand will be satisfied by including more advanced mathematical training in the education of engineers, physicists, biologists, and specialists in other fields to which mathematics is applied. Nevertheless, there will be a growing need for applied mathematicians who combine a high degree of mathematical competence with a broad knowledge of the field of application. The demand for people to do mathematical computation work will also expand.

Employment of mathematicians as college and university teachers should rise substantially during the 1960's. Enrollments in mathematics are expected to grow rapidly during this period, along with the growth in total college enrollments. It is expected that not only will the number of students majoring in mathematics increase, but the number of mathematics courses taken by students majoring in other fields will also rise. The greatest demand in college teaching will be for mathematicians with Ph. D. degrees, but there will also be many openings for holders of master's degrees. Colleges and universities will continue to provide most of the employment opportunities for specialists in theoretical mathematics.

Along with the anticipated rise in demand for mathematicians, an increase is expected in the number of mathematics graduates. If graduates in this field continue to represent the same proportion of all college graduates as in recent years, the number seeking employment in the profession will rise rapidly during the late 1960's; by 1970, it may be twice the number at the beginning of the decade. Nevertheless, unless the annual number of degrees awarded in mathematics rises far above anticipated levels, the demand for persons trained as mathematicians is expected to be much greater than the number of well-qualified new graduates available for employment. Very good employment opportunities are thus in prospect in the

profession through the mid-1960's, at least, and probably for much longer. For mathematicians with the Ph. D., particularly, employment opportunities are expected to be excellent.

### Earnings and Working Conditions

Mathematicians with bachelor's degrees employed in beginning positions in private industry had an average (median) salary of \$5,700 a year in 1960. New graduates with the master's degree received starting salaries about \$500 to \$1,000 per year higher. Annual salaries for new graduates with Ph. D. degrees, most of whom usually have some experience, averaged about \$11,000 a year in 1960.

In Federal Government positions in 1960, mathematicians with the bachelor's degree and no experience could begin at either \$5,335, or \$6,345 a year, depending on the individual's college record. Beginning mathematicians with 1 full year of graduate study could begin at \$6,345; those with 2 full years of graduate study at \$6,435. Mathematicians with the Ph. D. degree could start at \$7,560 or \$8,955.

Available information on beginning salaries of mathematicians employed as college and university teachers is limited to those with the Ph. D. degree. Starting salaries for these mathematicians ranged from \$4,900 to \$8,000 a year in 1960, for 9 months of teaching. (Some further indication of salary levels of mathematicians employed as college teachers may be obtained from the salary figures for all college and university teachers, presented in the statement on College and University Teachers. See

index for page number.) Mathematicians in educational institutions can sometimes supplement their regular salaries with income from special research projects, consulting work, and writing for publications.

Most mathematicians can look forward to an experience in earnings as they gain experience. According to the 1960 National Register of Scientific and Technical Personnel, the average (median) salary of mathematicians with 2 to 4 years' experience was \$7,000 a year and that of mathematicians with 20 or more years' experience was about \$11,000. Nearly all (90 percent) of the mathematicians with 20 years' experience earned at least \$7,000 and a few (10 percent) earned \$22,000 or more.

In general, mathematicians in private industry tend to have higher incomes than those in other types of employment. For example, the median annual income of mathematicians was about 10 percent greater in private industry than in Federal Government employment, and nearly 40 percent greater than in colleges and universities, according to the 1960 Register. Within a particular field of employment, holders of Ph. D. degrees usually earn considerably more than those with bachelor's or master's degrees.

### Where To Go for More Information

American Mathematical Society,  
190 Hope St., Providence 6, R.I.

Mathematical Association of America,  
University of Buffalo, Buffalo 14, N.Y.

## Statisticians

(D.O.T. 0-36.51)

### Nature of Work

The charts and tables displayed in magazines and newspapers and in business offices usually illustrate the findings of studies planned and conducted by statisticians. These studies provide government and business officials with the statistical information needed in making major decisions or help natural and social scientists extend their knowledge.

Statisticians use scientific methods to collect, analyze, and interpret numerical data for many purposes—for example, to forecast population growth or economic conditions, estimate the size of a corn crop, help determine the best design for a jet airplane or the effects of a new marketing program, or measure the effectiveness of vaccine in preventing polio.

Some statisticians spend most of their time

analyzing data collected by others and preparing reports on their findings. Others plan surveys or experiments to be used for collecting the basic information. Statisticians engaged in survey work may choose the sources from which data can most readily be obtained, determine the sample of people to be actually surveyed, draw up questionnaires or reporting forms, and prepare instructions for the survey workers who will collect the data and for the statistical clerks who will code and tabulate the returns. Statisticians who design experiments may prepare mathematical models which can be tested to confirm or contradict a particular theory. In designing either a survey or an experiment, the statistician's principal task is to obtain sufficiently precise information on the subject being studied with the least possible expenditure of time and money, or to secure the maximum amount of information for a given expenditure. Statisticians present their findings in summary tables, charts, and written reports.

As a rule, statisticians specialize either in mathematical statistics or in the application of statistical methods to a subject-matter field. Mathematical statisticians use mathematical techniques to design and improve statistical methods for obtaining and interpreting numerical information in any subject field. Applied statisticians use statistical methods to collect

and analyze data in a particular field—for example, economics, psychology, public health, finance, or engineering. Mathematical and applied statisticians frequently work together in making statistical studies.

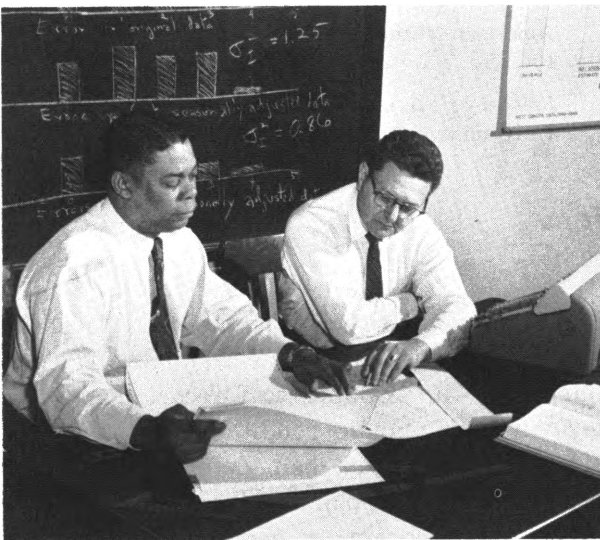
Many statisticians are engaged in research or perform administrative or supervisory functions in connection with research programs. Some are employed as college teachers—often combining teaching with research or administrative activities. Others serve as independent consultants to business firms and government agencies.

Because statistics is a tool which is used in many different fields, it is sometimes impossible to distinguish people who are primarily statisticians from those who are chiefly subject-matter specialists with only a limited knowledge of statistics. For example, an applied statistician who works with data on economic conditions may have the title of economist instead of statistician. On the other hand, a mathematical statistician engaged in applying probability theory to the development of new statistical methods may be classified as a mathematician. (See statement on Mathematicians which appears in an earlier part of this chapter.)

### Where Employed

About 20,000 professional workers were employed as statisticians in the United States in 1961. A small but growing proportion of these workers were mathematical statisticians.

The largest number of statisticians are employed by private industry, mostly in market research, administration, and quality control work. The Federal Government also employs a sizable number of statisticians. Every major Federal agency employs them, although more than four-fifths of all statisticians on Federal payrolls are in the Departments of Defense; Commerce; Agriculture; Health, Education, and Welfare; and Labor. Colleges and universities employ some statisticians and are a major source of employment for mathematical statisticians. Other statisticians are employed by State and local governments, nonprofit foundations, and research organizations. Some stat-



Photograph by U.S. Department of Labor

*Statisticians analyzing data collected in a survey.*

isticians are in business for themselves as statistical consultants.

### **Training, Other Qualifications, and Advancement**

The usual educational requirement for beginning positions in statistics is a bachelor's degree with a major in mathematics, or in economics or some other applied field and a minor in statistics. A master's degree in statistics or mathematics is often required for beginning positions in mathematical statistics and teaching, and is almost indispensable for promotion to high-level positions in mathematical statistics. The Ph. D. degree is essential for advancement to top level teaching positions and is an asset in obtaining high-ranking administrative positions and consulting work.

Courses essential for prospective statisticians include college algebra, plane trigonometry, analytical geometry, differential and integral calculus, and at least one course in statistical methods. Advanced courses in mathematics and statistical theory are desirable for many jobs and essential for those in mathematical statistics. Young people interested in becoming applied statisticians also need thorough training in a subject-matter field related to the type of work they will be doing. For example, a statistician employed by a stock broker would need a thorough knowledge of finance.

For Federal employment, the minimum requirement for a beginning position as a mathematical statistician is a bachelor's degree with 24 semester hours in mathematics and statistics. At least 12 of these semester hours must be in mathematics (including several courses beyond calculus, such as theory of equations, vector analysis, and differential equations) and 6 must be in statistics; however, certain advanced courses in mathematics may be substituted for the statistics requirement. For a beginning position as an analytical or survey statistician, the minimum requirement is a bachelor's degree with 24 semester hours in statistics or in one of several designated subject-matter fields, or 6 semester hours in statistics plus 24 semester hours in a combination of the subject-matter fields. These fields include agriculture, biological or physical sciences, demography, educa-

tion, engineering, health and medicine, and economics and other social sciences.

Minimum requirements for entrance positions in private firms are similar to those for Federal employment. For many quality control positions, statisticians also must have taken courses in engineering and in the application of statistical methods to manufacturing processes. For market research and forecasting, courses in business administration or a related field are helpful. For advancement in analytical and survey work, there is a trend toward requiring advanced academic training (in the subject-matter field as well as in statistics), in both Government and private industry.

Inexperienced statisticians with only the bachelor's degree often spend much of their time in clerical work on their first jobs. The ability to operate adding and calculating machines and tabulating equipment is, therefore, extremely helpful. In many types of employment, statisticians must also have considerable knowledge of modern tabulating equipment.

### **Employment Outlook**

The outlook is for substantial growth in employment of statisticians, both in the next few years and over the long run. Mathematical statisticians will be in the greatest demand. The growing emphasis on modern statistical methods in conducting research and the development of electronic data-processing equipment will help to increase both the number and proportion of mathematical statisticians, even in organizations which do not greatly increase their research staffs.

In addition to those needed to fill new positions, several hundred statisticians will be required each year to replace members of the profession who resign, retire, or die.

The largest expansion in employment is expected to occur in private industry. Persons who have broad training in mathematics and statistics as well as a knowledge of engineering or physical sciences will be in particular demand for quality control work in manufacturing and for work with scientists and engineers in research and development activities. Companies are also expected to rely more and more

on statisticians in analyzing and forecasting sales and business conditions, modernizing their accounting procedures, and solving other management problems. With the growing use of electronic computing machines, there will be an increasing demand for statisticians who are able to plan work to make the most efficient use of such equipment. (See index for statement on Programmers.)

Employment of statisticians in government agencies will probably rise moderately. Additional personnel will be needed not only in research and development work but also for expanded programs in such fields as social security, health, and education. Also, a large number of statisticians will continue to be employed in long-term programs involving the collection and analysis of economic data of many kinds.

Employment of statisticians as college and university teachers is also expected to rise through the 1960's, primarily as a result of increasing college enrollments and the consequent rise in employment opportunities for college teachers. Furthermore, many colleges are likely to offer additional courses in statistics, as the importance of statistical training in government, business, academic, and industrial research becomes more widely recognized.

### **Earnings and Working Conditions**

Starting salaries for new college graduates employed as statisticians in private industry averaged between \$375 and \$425 a month in early 1961, according to the limited information available. Starting salaries for beginning

mathematical statisticians with the bachelor's degree were usually somewhat higher. Beginning statisticians with master's degrees averaged about \$100 a month more than those with only bachelor's degrees.

In Federal Government positions, the annual starting salary for inexperienced mathematical statisticians with the bachelor's degree was either \$5,335 or \$6,345 in early 1961, depending on the individual's college record. Those with 1 year of graduate training could start at \$6,345, and those with 2 years of graduate training, at \$6,435. Mathematical statisticians with the Ph. D. degree were eligible to start at \$7,560 or \$8,955, depending on their college records and the type of research they would be doing.

Beginning salaries for analytical and survey statisticians with the bachelor's degree were either \$4,345 or \$5,355 a year in the Federal Government, depending on the individual's college record. Those with 1 year of graduate training but no experience were eligible to start at \$5,355; those with 2 years of graduate training, at \$6,435; and those with the Ph. D. degree, at \$7,560 or \$8,955.

Detailed information on starting salaries of statisticians employed by colleges and universities is not available. However, some indication of their salary levels may be obtained from the figures for college and university teachers as a group, presented in the statement on this profession. (See index for page number.)

### **Where To Go for More Information**

American Statistical Association,  
1757 K St. NW., Washington 6, D.C.

## **Actuaries**

(D.O.T. 0-36.55)

### **Nature of Work**

Actuaries are mathematicians whose main job is to keep insurance plans on a sound financial basis. They evaluate the probability of loss on whatever is to be insured. They develop and analyze statistical tables on mortality (death) and morbidity (sickness) rates. They are also concerned with the frequency of in-

juries and with personal and property losses from fire, burglary, explosion, and other hazards, and with the resulting costs. Taking into consideration the estimates of losses as well as estimates of their company's future expenses and investment income, actuaries determine the premium rates for each particular type of insurance policy. They may also be responsible for analyzing company earnings, developing



insurance plans, and preparing policy contract provisions.

The actuary's work requires an understanding of general business trends and of legislative, health, social, and other factors that may affect the insurance business. Actuaries must continually study new developments in these areas, in order to make certain that company insurance practices are sound.

Because of their broad knowledge of the insurance field, actuaries frequently work on problems arising in such insurance company departments as the investment, underwriting, and group insurance and pension sales and service departments. Those in executive positions may help determine general company policy and may testify before public agencies on proposed legislation which would affect the insurance business or on the justification for intended changes in company premium rates or contract provisions.

Actuaries employed by the Federal Government usually deal with a particular government insurance program, such as social security (old-age and survivors' insurance) or insurance for veterans and members of the Armed Forces. In State government positions, actuaries are involved in the supervision and regulation of insurance companies and may work on problems connected with unemployment insurance or workmen's compensation. Consulting actuaries perform services, on a fee basis, for private companies, unions, and government agencies. They are often hired by trustees who represent both employers and employees to set up employee pension and welfare plans.

### Where Employed

Approximately 1,700 professional actuaries were employed in the United States in 1960; about four-fifths worked in the life insurance field and one-fifth in property and casualty insurance (which includes workmen's compensation, automobile, accident and health, and fire insurance). A large majority of all actuaries are employed by private insurance companies. A few hundred are employed by consulting firms or are in business for themselves. The Federal Government employs about 50 actuaries,

chiefly in the Department of Health, Education, and Welfare and the Veterans Administration. Most of the remaining actuaries are employed by State government agencies; a few are with property and casualty insurance rating bureaus (associations which supply actuarial data to member companies).

The size of a company's actuarial staff depends upon the volume and nature of its insurance work. Large companies which sell all lines of insurance or have considerable group insurance business may employ as many as 50 to 100 actuaries. Small companies may have only one or two actuaries on their staffs or may rely entirely on consulting firms or rating bureaus for actuarial services.

### Training, Other Qualifications, and Advancement

A bachelor's degree with a major in mathematics is the generally accepted educational requirement for entry into actuarial work. Besides courses in mathematics—including differential and integral calculus, analytical geometry, mathematical statistics, probability, and finite differences—courses in insurance law, economics, investments, accounting, and other aspects of business administration and in English composition and speech may prove valuable. A well-rounded educational background, and the ability to deal with people and to express oneself clearly and simply are important qualifications.

Most actuaries gain professional status after passing a series of examinations, which cover language aptitude, general mathematics, and all phases of the insurance business. The examinations in life insurance are given by The Society of Actuaries, and those in property and casualty insurance by the Casualty Actuarial Society. An actuary becomes an "Associate" in the Society of Actuaries after completing that Society's first five examinations, and in the Casualty Actuarial Society after passing its first four examinations. The designation of "Fellow" is conferred after completion of all eight examinations given by either society. It usually takes more than 5 years to complete the entire series. For the more advanced examinations, experience in insurance work and inten-

sive home study are usually required. It is desirable for students to take some of the early examinations while still in college. Success in these examinations helps the student determine whether he has the ability to become an actuary and greatly increases his opportunities for employment.

In interviewing applicants for actuarial work, employers evaluate both their mathematical ability and personal characteristics, such as leadership, the ability to deal with people, and an interest in business problems. Preference is usually given to applicants who have passed at least two of the actuarial examinations, and to those with some actuarial experience. This experience is provided in many insurance companies which hire and train college undergraduates during the summer months.

A beginning actuary is usually rotated among different jobs in the actuarial department to learn the various actuarial operations and become acquainted with different phases of insurance work. At first, the actuarial trainee may make calculations or tabulations for actuarial tables or for the annual statement. Later, he may supervise actuarial clerks and be concerned with correspondence and reports.

Advancement to more responsible work as an assistant and later as associate or chief actuary depends largely upon on-the-job performance and passing the actuarial examinations. Some actuaries, because of their broad knowledge, qualify for administrative positions in other areas of company activity, particularly in the underwriting, accounting, or investment departments. A few advance to top executive positions as company vice presidents or presidents.

### Employment Outlook

Actuaries are expected to find very favorable opportunities for employment during the mid-1960's. Although the field is small, actuaries with the necessary education and background are expected to continue to be in demand. Both the insurance industry and government will have to compete with other employers for the limited supply of persons with good mathematical training. (See statements on Mathe-

maticians and Statisticians which appear in other parts of this chapter.)

Over the long run, the employment of actuaries is expected to increase in both the life and casualty insurance fields, primarily because of anticipated growth in the number and type of insurance policies. (See chapter on Insurance Occupations. Refer to index for page number.) More actuarial jobs will open up also because of increasing problems arising from changing and more complex insurance coverage. The rapidly growing number of group life insurance plans, as well as health and pension plans, will require additional actuarial service. The greater use of electronic data-processing machines by insurance companies may also require a few additional actuaries to help determine the best ways of utilizing this equipment to solve insurance problems.

In the property and casualty insurance field, additional actuaries will be needed to make the studies which are used as the basis for determining rate changes in the short-term policies typical of this field, and to present justification for these changes before State regulatory agencies. Increased sales of "multiple line" policies—which can include most kinds of insurance (except life) in one policy—may eventually lead to larger companies in the property and casualty field and these companies will also require the services of more full-time actuaries.

In addition to actuaries needed to fill new positions, some will be needed to replace those who resign, retire, or die. However, since actuaries are a relatively small group, the number of openings in any one year will be few.

Employment opportunities will probably continue to be good for the few women who choose this field and qualify as actuaries. However, young women who withdraw temporarily from the labor market because of family responsibilities or for other reasons may find it difficult to complete the years of continuous training and study required to gain full professional status.

### Earnings

Starting salaries of new college graduates hired as actuaries in insurance companies were

generally between \$5,000 and \$5,500 a year in 1960, according to the limited information available. Those who had passed some of the preliminary actuarial examinations given by the professional societies usually received considerably higher starting salaries. Fellows of either Society, or persons with comparable knowledge, experience, and ability in actuarial work, usually received \$10,000 a year or more. Earnings increase with experience and added work responsibility. Annual salaries of \$25,000 and more may be earned by actuaries in executive positions in large companies.

In the Federal Government in 1960, begin-

ning actuaries with the bachelor's degree could start at either \$5,335 or \$6,345 a year, depending on the applicant's college record. Many actuaries in government positions were earning more than \$10,000 a year in 1960, and a few were earning \$15,000 or more.

#### **Where To Go for More Information**

Society of Actuaries,  
208 South LaSalle St., Chicago 4, Ill.

Casualty Actuarial Society,  
200 East 42d St., New York 17, N.Y.

# TECHNICIANS WHO WORK WITH ENGINEERS AND PHYSICAL SCIENTISTS

Technicians who work with engineers and physical scientists are among the fastest growing occupational groups in the United States. In recent years, the needs of the Nation's defense program, added to those of the expanding civilian economy, have greatly intensified the demand not only for engineers and scientists but also for the technical workers who assist them—the technicians with whom this chapter is concerned.

The chapter covers only those technicians who work with engineers and physical scientists (D.O.T. 0-67). It includes a discussion of the general nature of their work, and of some of the specialized areas of technology in which they are trained and employed. It also includes information on where they are employed, their employment prospects, and their earnings.

In addition to the technicians described in this chapter, there are many thousands of workers whose jobs require technical competence and considerable training and experience, but who do not normally work directly with engineers and scientists. These workers include, for example, draftsmen and broadcast technicians, who are described elsewhere in the Handbook, as well as many inspectors, production supervisors, and some persons who maintain complex machinery and equipment. Information on technical occupations in the health field—including medical laboratory technicians, medical X-ray technicians, and dental hygienists—is presented elsewhere in the Handbook (See index for page references.)

## **Nature of Work**

The term "technician" has been used by different employers to refer to workers in a great variety of jobs, with many different job titles. There is no generally accepted definition of this

term. In some cases, it has been applied to employees doing relatively routine work, in others, to persons performing work requiring skills within a limited sphere, and again to persons who do complex work of a highly technical nature as assistants to engineers and scientists. The workers' job titles may be descriptive of their technical level (for example, engineering technician, scientific assistant, or junior engineer) or they may relate to the nature of the work done (for example, laboratory assistant, production analyst, time-study analyst, or tool designer). Some employers use the word "technician," modified by adjectives such as mechanical, electrical, electronics, or chemical, which are descriptive of areas of technology in which personnel are employed.

In this chapter, the term "technician" refers to technical workers whose jobs require basic scientific and mathematical knowledge and specialized education or training in some aspect of technology or science, and who, as a rule, work directly with scientists and engineers. In general, the jobs are technical in nature but more limited than those of the engineer or scientist, and have a greater practical orientation. Many of these technician jobs require the ability to analyze and solve problems and prepare formal reports on experiments, tests, or other projects. Nearly all technicians require the ability to communicate orally or in writing. Some require considerable aptitude in mathematics and the ability to visualize objects and to make sketches and drawings. Design jobs often require creative ability. Many of these technician jobs require some familiarity with one or more of the skilled trades, although not the ability to perform as a craftsman. Still others demand extensive knowledge of industrial equipment and processes. Sometimes jobs held by these technicians are of a supervisory nature

and require both technical knowledge and the ability to handle people.

Frequently, technician jobs require use of complex electronic and mechanical instruments, experimental laboratory apparatus, drafting instruments, and an understanding of tools and machinery. Almost all of the technicians whose jobs are described in this chapter must be able to use engineering handbooks and computing devices, such as the slide rule or calculating machines.

Technicians work with engineers and physical scientists in virtually every aspect of engineering and scientific work. One of their largest areas of employment is research, development, and design work. Technicians in this type of activity generally serve as direct supporting personnel to engineers or scientists. In the laboratory, they conduct experiments or tests; set up, calibrate, and operate instruments; and make calculations. They may assist scientists and engineers in developing experimental equipment and models, do drafting, and frequently assume responsibility for certain aspects of design work under the engineer's direction.

Technicians in jobs related to production usually follow a course laid out by the engineer or scientist, but they often work without close supervision. They may aid in the various phases of production planning, such as working out specifications regarding needed materials and methods of manufacture. Sometimes technicians devise tests to insure quality control of products, or make time and motion studies designed to improve production flow and the efficiency of operations. They may also perform liaison work between departments such as engineering and production.

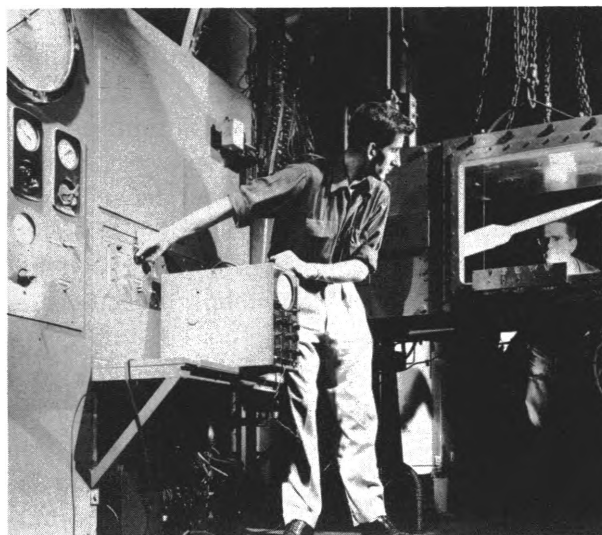
Technicians are often assigned work that might otherwise have to be done by engineers. They may advise on installation and maintenance problems, serve as technical representatives of manufacturers seeking to aid contractors or other customers in achieving maximum utilization of technical products, or work as technical writers of specifications and manuals.

The following sections describe a number of areas of technology in which technicians who work with scientists and engineers are trained and employed.

*Aeronautical Technology.* Technicians specializing in this area of technology work with engineers and scientists in many phases of aircraft design and production engineering. They work on conventional aircraft, helicopters, rockets, guided missiles, and spacecraft, and on propulsion systems and controls as well as aircraft structures.

Many of these technicians aid engineers in design work and on other projects. Often they assist in preparing layouts of aircraft structures or equipment installations by collecting information, making calculations, and performing many other tasks. They work on projects involving stress analysis, aerodynamics, structural design, flight test evaluation, weight control, or propulsion problems. For example, under the direction of an engineer, a technician might be assigned the problem of estimating weight factors, centers of gravity, and other items affecting an airplane's load capacity. Other technicians working on engineering projects prepare or check engineering drawings for technical accuracy, practicability, and economy.

Technicians sometimes help estimate the cost of the materials and labor needed to manufacture airplanes, parts, and equipment. They may also be responsible for liaison between the engineers who do the planning and development



Courtesy of National Aeronautics and Space Administration  
*Technician assisting engineer in experimental high-speed wind tunnel study.*

work and the people who convert the engineers' ideas into finished products. As an airplane is built, the liaison technician checks it for conformance with specifications, keeps the engineer informed as to progress, and investigates any production engineering problems that arise. He may recommend minor changes in the design, the materials used, or the method of fabrication, which would expedite production of parts or assemblies.

Other aeronautical technicians are employed as manufacturers' field service representatives, serving as the link between their employers and the military services, commercial airlines, and other customers. Technicians with a flair for writing often prepare instruction manuals, bulletins, catalogs, and other technical materials. (See also statements on Aeronautical Engineers and Airplane Mechanics, and chapter on Occupations in Aircraft, Missile, and Spacecraft Manufacturing elsewhere in the Handbook. Refer to index for page numbers.)

*Air-Conditioning, Heating, and Refrigeration Technology.* Heating, cooling, and refrigerating are essential to defense operations as well as to health and comfort in our daily lives and to the operation of many factories, stores, and other businesses. Technicians in this field often become specialists in one area of work, such as refrigeration, and sometimes in a particular type of activity, such as research and development, or design of layouts for heating, cooling, or refrigeration systems.

In the manufacture of air-conditioning, heating, and refrigeration equipment, technicians work in research and engineering departments, usually as aids to engineers and scientists. They may also be assigned such jobs as devising methods for testing equipment or analyzing production methods.

Technical sales work for equipment manufacturers is still another area of employment for technicians. In such work, they must be able to supply contractors who design and install systems with information on such technical subjects as installation, maintenance, operating costs, and expected performance of equipment.

An air-conditioning, heating, or refrigeration system requires equipment for changing temperature and duct-work or piping for distributing hot or cold air, hot water or steam, or refrigerating fluid. Technically trained personnel assist in designing such systems and in preparing instructions for their installation. In designing the layout for an air-conditioning or heating system, they must determine the heating or cooling requirements, decide what kind of equipment would be best for the job, and estimate costs. In this work, they must also consider such problems as filtering air and controlling moisture. (See statement on Refrigeration and Air-Conditioning Mechanics elsewhere in the Handbook. Refer to index for page number.)

*Chemical Technology.* Technicians specializing in this area work with chemists and chemical engineers in the development, production, sale, and utilization of chemical products and equipment. They apply their knowledge of chemistry and other physical sciences and of apparatus and equipment to such work as the control of complicated chemical processes or laboratory research. The field of chemistry is so broad that chemical technicians often become specialists in the problems of a particular industry and in a particular type of activity—for example, research or quality control.

Most chemical technicians assist chemists and other scientists or engineers in research



*Women technicians are often employed in laboratory work.*

and development, testing, or other laboratory work. Those helping to conduct experiments may make the computations and tabulate and analyze results. In testing work, technicians make chemical tests to determine whether particular substances are present and, if so, in what quantities. They may, for example, analyze steel for carbon, phosphorous, and sulfur content, or water for the amount of silica, iron, and calcium present. They also perform experiments to determine the characteristics of substances as, for example, the viscosity and flash point of oil. The work of technicians employed in research or testing laboratories often requires the assembly and use of such apparatus and instruments as dilatometers, interferometers, analytical balances, and centrifuges.

Outside the laboratory, chemical technicians are sometimes employed to supervise various operations in the production of chemical products and as technical salesmen of chemicals and chemical equipment. (See statements on Chemists, Chemical Engineers, and chapter on Occupations in the Industrial Chemicals Industry elsewhere in the Handbook. Refer to index for page numbers.)

*Civil Engineering Technology.* Technicians trained in this area assist civil engineers in performing many of the tasks necessary in the planning and construction of highways, railroads, bridges, viaducts, dams, and other structures. On a construction project that is being planned, technicians may help in estimating costs, preparing specifications for materials, or participate in surveying, drafting, or designing work. Once the actual construction work has begun, they may assist the contractor or superintendent in scheduling construction activities and inspecting the work for conformance with blueprints and specifications.

Many persons trained in civil engineering technology become draftsmen, surveyors, or specialists in other well-established technical jobs. Those working as surveyors determine the locations and measurements of land areas and buildings for construction and other purposes, using the transit, the level, and other surveying instruments. Those employed in other technical jobs include estimators who pre-

pare estimates of the costs, materials, and time necessary in the construction or repair of various structures; and highway inspectors, who usually supervise the clearing of rights-of-way and the preparation of roads for surfacing. (See statements on Civil Engineers and Draftsmen elsewhere in the Handbook. Refer to index for page numbers.)

*Electronics Technology.* This field includes radio, radar, sonar, telemetering, television, telephony, and other forms of communication; industrial measuring, recording, indicating, and controlling devices; navigational equipment; missile and spacecraft guidance and transmitting instruments; electronic computers; and many other types of equipment using vacuum tubes and semiconductor circuits. Because the field is so broad, technicians generally become specialists in one area—for example, communications—and often in a subdivision such as radio or telephony. They may also specialize in some aspect of industrial electronics—for example, induction or dielectric heating, servomechanisms, automation controls, or ultrasonics.

Technicians working with engineers and physical scientists in the field of electronics



*Technician wiring a rocket nose cone for a space capsule.*

need a strong background in electronics theory and mathematics to enable them to handle complex technical work above the level involved in routine operating and repair jobs. (For additional information on service and repair jobs in the electronics field, see statement on Radio and Television Servicemen. Refer to index for page number.) These electronics technicians may, for example, be assigned such tasks as preparing or interpreting layouts and other diagrams, or the development and testing of experimental electronic units, or assisting scientists and engineers in the design of electronic circuits. Their work often calls for use of engineering handbooks; oscilloscopes, signal generators, ohmmeters, multimeters, Q-meters, and other instruments; and computing devices, including slide rules.

Electronics technicians employed in research activities usually assist scientists or engineers in designing, testing, and modifying experimental electronic devices. They may be called upon to devise practical solutions to problems of design, select suitable materials, determine the best method of building a piece of equipment, and test and evaluate the operating characteristics of the equipment after it is built. They may also be assigned to make necessary modifications in experimental equipment.

Electronics technicians working with engineers in manufacturing operations may help in designing and setting up different types of testing equipment and devising quality control and other tests for manufactured products. (See also chapters on Occupations in Aircraft, Missile, and Spacecraft Manufacturing, and Electronics Manufacturing Occupations.)

Electronics technicians may also be employed in special maintenance and repair jobs where knowledge above the routine repair level is needed. Electronics maintenance technicians employed by the Federal Aviation Agency, for example, are responsible for keeping radar and other electronic equipment in perfect working order for effective air traffic control. Electronics technicians employed by the Department of Defense service radar, sonar, loran, and other warning and detection devices. Manu-

facturers and purchasers of electronic computers frequently employ electronics technicians to maintain these complex machines.

Persons with training and experience in electronics may be employed as broadcast technicians in the engineering departments of radio and television broadcasting stations to operate and maintain the electronic equipment in the studio and at the transmitter. Many broadcast technicians are employed in supervisory jobs and, in some instances, may be responsible for the entire technical operation of the station. Technicians who operate transmitters must meet Federal Communications Commission licensing requirements. (For additional information on broadcast technicians, see chapter on Radio and Television Broadcasting Occupations. Refer to index for page number.)

*Industrial Engineering Technology.* Technicians trained in this area are sometimes called industrial technicians or production technicians. They assist industrial engineers on problems involving the efficient use of men, materials, and machines in mass production. Their work includes such tasks as preparing layout of machinery and equipment, planning the flow of work, and making statistical studies and analyses of production costs to eliminate unnecessary expense. They may study different production methods and their costs in order to find out the best way of manufacturing a particular item.

The industrial technician may also assist the engineer in conducting time and motion studies. These studies involve timing and analyzing the movements workers make as they do their jobs. On the basis of information obtained, changes in the tools and equipment used and in the organization of operations may be recommended.

In the course of their duties, many industrial technicians acquire experience which enables them to qualify for other jobs. For example, those expert in machinery and production methods may move into the field of industrial safety. Others who specialize in job analyses may become involved later in the setting of job standards and in the interviewing, testing,



hiring, and training of personnel. (See statement on Industrial Engineers. Refer to index for page number.)

*Mechanical Engineering Technology.* Mechanical engineering technology is a broad term which is sometimes used to cover a large number of specialized fields, including automotive technology, diesel technology, tool design, and machine design.

Technicians trained in one of the above areas of technology often assist engineers in design and development work by making free-hand sketches and rough layouts of machinery and other equipment and parts. Using engineering data and specifications and other available information, they help in determining whether a proposed design change is practical and how much it will cost to produce. They may also be called upon to apply their knowledge of mechanical engineering principles to solve particular design problems such as those involving tolerances, stress, strain, friction, and vibration.

Planning and carrying out tests on experimental engines and equipment for performance, durability, and efficiency is a large area of work for technicians. As part of the testing procedure, they record data, make computations, analyze results and write reports. They sometimes make recommendations for changes in design to meet performance requirements. Their jobs often require the use of instruments and gages such as dynamometers, as well as the ability to prepare and interpret drawings.

Some workers with training in mechanical engineering technology are employed in manufacturing departments to help develop plans for testing and inspecting engines and equipment, or to work with engineers in eliminating production problems. Some obtain jobs as technical salesmen. (See statements on Mechanical Engineers, Automobile Mechanics, and Diesel Mechanics elsewhere in the Handbook. Refer to index for page numbers.)

One of the better known specialties which may be grouped under mechanical engineering technology is that of *tool designer*. The tool designer designs tools and devices for the mass production of manufactured articles. He origi-

nates and prepares sketches of the designs for cutting tools, jigs, dies, special fixtures, and other attachments used in machine operations. He may also make detailed drawings of these tools and fixtures, or supervise others in making them. Besides developing new tools, designers frequently redesign tools currently in use to improve their efficiency.

In order to perform his highly technical job, the tool designer must have a knowledge of machine shop practice and of drafting, and a good background in advanced algebra, geometry, and trigonometry. He must also be familiar with the characteristics of the materials of which tools and fixtures are made. In addition, he needs a knowledge of manufacturing procedures, and the advantages and disadvantages of various methods of production, so that he can design tools which will produce the article desired as efficiently and cheaply as possible.

Machine drafting with some designing is another major area of work which is often grouped under mechanical technology. Draftsmen's jobs are described elsewhere in the Handbook. (See index for page number.)

*Other Areas of Technology.* Many fields of work besides those described above offer opportunities for technicians with appropriate training. Those trained in *metallurgical technology*, for example, work with metallurgists and metallurgical engineers in processing metals and converting them into finished products. Their jobs may include testing of metals and alloys to determine their physical properties, or working in research laboratories on such projects as developing new ways of treating and using metals and alloys. *Mathematics aids*, another technician group, assist mathematicians, engineers, and scientists by doing computations involving the use of algebra, logarithms, trigonometric functions, and higher mathematics. Still other fields of work for technicians include: cartography (mapmaking), electrical technology, gas turbine technology, optical technology, and petroleum technology.

As industry becomes increasingly mechanized new technical occupations are constantly

emerging. For example, *instrumentation technology*, a new and growing area of employment, has evolved from the introduction of more and more automatic controls and precision measuring devices in manufacturing operations. In industrial plants and laboratories, instruments are used to record data, to control and regulate the operation of machinery, and to measure time, weight, temperature, speeds of moving parts, mixtures, volume, flow, strain, and pressure. Technicians—who may have either specific training in instrumentation or training chiefly in electronics, mechanics, or hydraulics—work with the engineers and scientists who develop these highly complex devices, and with those who use them for research and development work. (See also statement on Instrument Makers. Refer to index for page number.)

Another new area of work for technicians, which has resulted from recognition of the need for a more scientific approach toward the reduction of industrial hazards, is *safety technology*. In the rapidly growing atomic energy field, technicians work with scientists on problems of radiation safety, inspection, and decontamination. (For a more detailed description of technicians employed in the atomic energy field, see chapter on Occupations in the Atomic Energy Field. Refer to index for page number.)

### Where Employed

An estimated 340,000 engineering and physical science technicians, not including draftsmen, were employed in the United States in 1959. More than 250,000 of these technicians, about three-fourths of the total, were employed by private industry. The industries employing the largest numbers of engineering and physical science technicians are electrical equipment and aircraft manufacturing. The machinery, chemicals, and fabricated metal products industries also utilize large numbers of technicians. These five industries accounted for about half of all engineering and physical science technicians employed in private industry in 1959.

The Federal Government also employs sizable numbers of technicians who work with engineers and physical scientists. In 1959, the Federal agencies had more than 40,000 employees

in the following occupational categories: engineering technician, engineering aid, equipment specialist, electronics technician, cartographic aid, physical science aid, meteorological aid, and mathematics aid. There were also a relatively small number of such technicians in other kinds of jobs. Of those in the selected technical occupations mentioned above, about 23,300, or more than half, were in the Department of Defense. The Departments of the Interior, Commerce, and Agriculture combined employed an additional one-third, or about 14,500 technicians, and the remainder were scattered among a number of other Government agencies.

State and local government agencies employ about the same number of engineering and physical science technicians as are employed by the Federal Government. Most of the remainder are employed by nonprofit organizations, independent commercial laboratories, and colleges and universities.

### Training and Other Qualifications

Young men and women who wish to prepare for technical careers can obtain formal education for their work from a number of sources including technical institutes, junior and community colleges, extension divisions of universities, colleges offering 2-year technical programs, some large comprehensive high schools, technical high schools, and vocational-technical high schools. In recent years, public schools of the types listed have been putting a great deal of emphasis on developing curriculums to qualify young people for technician occupations as a result of the stimulus provided by title VIII of the National Defense Education Act of 1958. Many engineering students who have not completed all requirements for a degree and some liberal arts students and others with post-high-school education in mathematics and science are able, with additional technical training and experience, to qualify for technician jobs assisting scientists and engineers. Very often persons become qualified for the technician jobs with which this chapter is concerned through on-the-job training and experience, plus formal course work taken on a part-time

basis either through classroom or, occasionally, through correspondence courses.

Schools which specialize in preparing students for technical jobs usually design their curriculums so that, on completion of their training, individuals can become productive with only a minimum of on-the-job training. Courses given by these schools usually include science, mathematics, and engineering, with subject matter related to the practical problems students will meet on the job. Students are also given instruction in the use of instruments, machinery, and tools to gain a familiarity with the equipment, rather than to develop skills.

The entrance requirements of schools specializing in education for technical jobs are usually less rigid and standardized than those of 4-year colleges. All institutions offering post-high-school technical training organize their courses for high school graduates, and most of the courses offered in these institutions are of college level. However, some will admit students without a high school diploma if they have completed the equivalent of a full high school course, or if they can pass special examinations, or otherwise demonstrate their ability to perform work above the high school level and can show that they are able to profit from the training offered. Some schools even have arrangements for helping students make up deficiencies in mathematics and science subjects. On the other hand, many institutions admit only high school graduates who have had mathematics and science courses. For all the occupations considered in this chapter, basic training in mathematics and science is essential, and students interested in preparing for technical careers should, therefore, obtain as good a background as possible in these subjects while in high school.

Because of the variety of educational institutions where training may be obtained and the differences in the kind and level of training offered, a person seeking a technical education should use more than ordinary care in selecting a school. Information should be secured about State accreditation, professional recognition, the length of time the school has been in operation, instructional facilities, faculty quali-

fications, transferability of credits, and the kinds of jobs obtained by the school's graduates. Students should also look into the costs of technical education and available scholarships and other financial aids. (See section on *Where To Go for More Information.*) Above all, a student should realize that there is no quick and easy method of acquiring the background in mathematics, chemistry, and other physical sciences which will enable him to qualify for the technicians' jobs described in this chapter.

A brief discussion of some of the types of educational institutions and other sources where young people can obtain training as technicians follows.

*Technical Institutes.* Technical institutes offer 1, 2, or 3 years of education above the high school level. Two years is the usual training period.

The programs of technical institutes are usually designed to give the prospective technician an engineering and science background which prepares him for some specific job or cluster of related jobs. The scope of these programs is more limited than that required to prepare a person for a career as a professional engineer. Much emphasis is placed on laboratory and drafting work in order to familiarize students with instruments, equipment, and techniques used in industry. In general, the student receives intensive technical training but less theoretical and general education than is provided by 4-year engineering and liberal arts colleges.

Some schools offer cooperative programs under which a student spends part of his time in school and part in employment related to the occupation for which he is preparing himself. It may take more than 2 years to complete the curriculum at a technical institute with a cooperative plan, but this type of program gives students valuable work experience, which often outweighs the disadvantages of a longer training period. In addition, students participating in cooperative programs frequently earn enough to pay for at least a part of their educational expenses.

Most technical institutes conduct both day and evening sessions. By attending evening

classes, employed workers can often become qualified for technician jobs. Almost half of the students attending technical institutes in 1958 were enrolled part time in evening and special classes.

Some technical institutes give associate degrees which signify that the student has completed at least 2 years of college-level work. If the prospective student desires eventually to obtain a bachelor's degree from a 4-year college, he should investigate in advance whether his technical institute credits are transferable to the college of his choice. Although some colleges give full or partial credit for work taken at approved technical institutes, others do not.

The amount of general education offered varies greatly from one technical institute to another. Some institutes offer intensive training for technical occupations but almost no general education, whereas others require students to spend as much as 25 percent of their time in such courses as English and history and 75 percent in specific courses in their technical field.

Some technical institutes are operated as regular or extension divisions of colleges and universities. Others are separate institutions operated by States or municipalities, privately endowed institutions, and proprietary schools. Altogether, there were about 112 technical institutes with a total of more than 49,000 full- and part-time students in 1958.

*Junior or Community Colleges.* Many junior and community colleges in the United States also prepare students for technician occupations in industry and government. According to a U.S. Office of Education survey, 143 out of a total of 523 junior and community colleges offered programs for training scientific and engineering technicians in the fall of 1958. These colleges had more than 15,000 students enrolled in full-time study in technical programs, and almost 12,000 students studying on a part-time basis. Two years of post-high-school education is usually offered by such schools and it is common practice for them to award the degree of associate in arts or science upon completion of the 2-year program.

Not all junior colleges are equipped to give technical training of the type described in this report, nor do most of them consider this their primary purpose. In contrast with most technical institutes which concentrate upon terminal education (after which the student is not ordinarily expected to take advanced work elsewhere), junior colleges usually offer courses equivalent to those given in the freshman and sophomore years of 4-year colleges, so that their graduates can go on into the junior year in a 4-year college.

Junior college courses in technical fields are often planned around the employment needs of the industries in their locality. The training programs for prospective technicians therefore vary and may include highly specialized preparation in addition to general courses. In some cases, the courses are designed to meet the specifications of one or two industries or even of a single plant.

Many junior colleges are important adult education centers with extensive night-school programs. Through appropriate part-time study at junior colleges, as at technical institutes, workers may prepare themselves for technician jobs.

*Training in Industry.* Some large corporations conduct training programs to meet their need for technically trained personnel. This type of training is primarily technical and rarely includes any general studies. Instruction is given both through formal classes and through training on the job. Workers who are trained wholly on the job generally get less theoretical background than those who receive formal instruction.

Other employers who do not have training programs, but are aware of the need for technically trained workers, often encourage their employees to attend classes in local schools or to enroll in correspondence courses. Employers sometimes ask the schools to arrange special educational programs which will expand the technical background of their employees. Some large corporations reimburse their employees for tuition after they have completed courses satisfactorily. The workers are usually expected

to take courses directly related to their work assignment, and are sometimes allowed to attend classes on the employer's time.

Training for some occupations in the technician category—tool designers and electronic technicians, for example—may be obtained through a formal apprenticeship. In addition to on-the-job training, supplementary education in mathematics and science is provided. Persons interested in apprentice training may obtain further information from the local office of their State employment service, directly from employers, or from the local labor union concerned with the occupation they wish to learn.

*Other Training.* Although most of the jobs considered in this report require post-high-school education or the equivalent in experience, a few advanced technical high schools, principally in large cities, offer programs which qualify their graduates for technical entry jobs. These high schools have high admission requirements and offer more thorough and advanced courses in mathematics, science, drafting, and laboratory work than are usually available in academic high schools. They sometimes offer an additional year of schooling beyond the 12th grade. Some schools have evening courses which may be organized as formal technical programs to prepare technicians or which may cover only a few subjects related to a particular area of work. These programs, like other evening courses, are designed especially for employed persons who wish to improve their job status by increasing their technical knowledge.

Correspondence schools offering home study courses are an additional source of preparation for technicians. Persons who wish to learn more about their jobs or who wish to advance to a better job in the same field are the ones who derive the most benefit from such courses. Success in such courses depends greatly on the ability of the student to study by himself.

In addition to the sources of training already discussed, many thousands of technicians are trained each year by the Armed Forces. The Army, Navy, Air Force, Marine Corps, and Coast Guard all train their own specialists.

Some trainees are given intensive short courses; others receive extensive training of a year or more. Much of the training is transferable from military to civilian jobs, and many of the technicians trained by the military establishments utilize their training in civilian employment after they leave the Armed Forces.

### Employment Outlook

The outlook is for continued expansion in employment of technicians in the years ahead. In recent decades, technicians have been one of the fastest growing occupational groups, and there is every indication of continued rapid growth in these occupations. In addition, several thousand technicians are needed each year to replace those who retire or die or transfer to other occupations.

Underlying the increase in demand for technicians are the general expansion of American industry and the increasing complexity of modern technology. The trend toward automation of industrial processes, the Nation's vast highway building program, and the growth of new areas of work, such as the atomic energy field, and the earth satellite and other space programs, are expected to add to the demand for technical personnel. The demands of the defense program, particularly in the aerospace and electronics fields, will result in a growing need for workers in the technician category.

Also of great importance to the longrun growth in the employment of technicians is the prospect of a continued high level of government and private expenditures for research and development in future years. More and more companies are establishing new research programs and strengthening existing programs to meet the strong competition in developing new products and processes. Furthermore, expenditures for defense-related research are expected to continue at a high level.

It is anticipated that technicians will be needed in large numbers in research, development, design, and other work which must precede the manufacturing process. As products and the methods by which they are manufactured become more complex, increasing num-

bers of technicians are also expected to be required to assist engineers in such activities as production planning, maintaining liaison between production and engineering departments, and technical sales work.

The number of job openings available to technicians in any one year will, however, reflect the general economic situation and changes that may occur in the Nation's defense program.

Employment opportunities for women technicians have been chiefly in drafting jobs, in chemical and other laboratory work, and in computation and other work requiring application of mathematics. Over the long run, it is likely that more women will be trained and find employment in these and other technician occupations.

### Earnings

In general, a technician's earnings depend upon his education, his technical specialty, and his work experience. Other important factors which influence his earnings are the type of employer for whom he works, the kind of work he does, and the geographic location of his job.

Starting salaries for the majority of post-secondary technical school graduates ranged from \$3,600 to \$5,400 a year in 1960, according to the limited information available. That most technicians can look forward to a significant increase in earnings as they gain experience, is illustrated by information from the follow-up studies conducted by a number of technical schools. These studies show most of the graduates earning between \$6,000 and \$8,000 a year after about 5 years of experience.

In the Federal Civil Service, graduates of a 2-year technical institute accredited by the Engineers Council for Professional Development, or an equivalent course of study, were eligible to start at \$4,040 a year in 1960. Some Federal Government agencies hire high school graduates and train them for technician jobs. Beginning salaries for these jobs ranged from \$3,500 to \$3,760 a year, depending on the individual's high school courses and experience.

The majority of experienced technicians working for the Federal Government earned between \$4,000 and \$6,500 in 1960, and some earned considerably higher salaries.

### Where To Go for More Information

General information on careers for technicians who work with engineers and physical scientists may be obtained from:

Engineers' Council for Professional Development,  
29 West 39th St., New York 18, N.Y.

Technical Institute Division, American Society for  
Engineering Education,  
University of Illinois, Urbana, Ill.

National Council of Technical Schools,  
1507 M St. NW., Washington 5, D.C.

Information on training opportunities may also be obtained from the Engineers Council for Professional Development, a nationally recognized accrediting agency for technical institute programs; the National Council of Technical Schools; and:

U.S. Department of Health, Education, and Welfare,  
Office of Education, Division of Higher  
Education and/or Division of Vocational Educa-  
tion, Washington 25, D.C.

State departments of education at each State capital also have information about approved technical institutes, junior colleges, and other educational institutions offering post-high-school training for specific technical occupations. Other sources include:

The American Association of Junior Colleges,  
1785 Massachusetts Ave. NW., Washington 6, D.C.

National Home Study Council,  
2000 K St. NW., Washington 6, D.C.

Information on apprenticeship may be obtained from the Bureau of Apprenticeship and Training, U.S. Department of Labor, Washington 25, D.C., or one of the regional offices of the Bureau or State apprenticeship agencies.

The U.S. Civil Service Commission, Washington 25, D.C., will furnish information on how to apply for positions in Federal Government agencies.

# SOCIAL SCIENCES

The social sciences are concerned with the whole range of human society and its activities, from the origin of man to the latest election returns. Social scientists, however, generally specialize in one of several major fields, in each of which human behavior is studied from a different point of view. Those specializing in anthropology study primitive tribes, reconstruct lost cities and civilizations, and are concerned with the cultures and languages of all peoples. Economists study the ways in which man makes a living and analyze the factors which help or hinder him in satisfying his material needs. Historians describe and interpret the events of the past. Political scientists are concerned with the problems of government. Sociologists deal with the behavior and relationships of groups such as the family, the community, and minorities.

Besides these basic social science fields, there are a number of closely related fields, some of which are covered in separate statements in this Handbook. (See statements on Geographers, Statisticians, Psychologists, and Social Workers.)

About 50,000 people were professionally employed in the basic social sciences in 1960, according to rough estimates based on information from a variety of sources. Fewer than 10 percent of the total were women. Because of overlapping among the basic social science fields and also with such related fields as business administration, foreign service work, and high school teaching, it is extremely difficult to determine exactly the size of each social science profession. Economists, however, are the largest group and anthropologists, the smallest.

The majority of all social scientists are employed by colleges and universities. The Federal Government is the second largest employer, especially of political scientists and economists. Except for economists, private industry employs comparatively few persons in professional

social science positions, but there is a trend toward hiring increasing numbers of college graduates who have majored in the social sciences as trainees for administrative and executive positions in a variety of industries. Research councils and other nonprofit organizations provide an important source of employment for economists and sociologists.

## Employment Outlook

Employment in the social sciences has been increasing and is expected to grow rapidly during the 1960's, mainly because of the anticipated rise in college teaching positions. The reasons for this expected increase are discussed in the statement on College and University Teachers. (See index for page number.) A moderate rise in employment is also expected in government as a result of the growing reliance on social scientists for administrative as well as research assistance. Employment in government agencies is most affected by changes in public policy. For example, new legislation in areas such as health insurance or urban planning would increase the demand for social scientists. A moderate rise in employment in private industry and nonprofit organizations is also expected. In addition to personnel required for new positions, many hundreds of social scientists will be needed each year to replace those who leave the field because of retirement or death, or for other reasons.

Social scientists with doctor's degrees are likely to have very good employment opportunities during the 1960's, in both teaching and nonteaching positions, barring a sharp rise in the proportion of college graduates majoring in the social sciences. For those with less formal training, the employment situation will differ considerably among the several social science fields. These differences are discussed in the sections which follow.

### Earnings

Starting salaries for social scientists employed as instructors generally ranged from about \$4,500 to \$6,000 in large colleges and universities in 1960, according to data from a variety of sources. Generally, the positions paying salaries near the top of this range required the Ph. D. degree or some experience and completion of all requirements for the Ph. D. degree except the doctoral dissertation. In the majority of colleges and universities, salaries, of professors were 60 to 75 percent higher than instructors' salaries; in some very large universities, the difference was much greater.

In the Federal Government, the beginning salary in 1961 for social scientists with a bachelor's degree was \$4,345 a year. Those with a superior academic record or with a year of graduate training were eligible for positions at an annual salary of \$5,355. Starting salaries were higher for candidates with additional graduate training. Many experienced social scientists in the Federal Government earned from \$9,000 to \$11,000 a year, many with administrative responsibilities earned at least \$12,000—in a good many cases considerably more.

Economists and political scientists earn more, on the average, than other social scientists. They receive higher salaries in colleges and universities. Furthermore, more of them are employed in government agencies and private industry where salary levels tend to be higher than in academic positions. In general, social scientists with the Ph. D. degree earn substantially higher salaries than those with the master's degree. Women social scientists usually earn substantially less than men of comparable age, experience, and level of education.

Many social scientists have some income in addition to their regular salaries. Summer teaching is the principal source of such income in all fields, but consulting work is an important

source of supplementary income for economists, political scientists, and sociologists. Income from royalties is a more common source of supplementary earnings for historians. Social scientists regularly employed by colleges and universities are the group most likely to have additional earnings. Comparatively few Federal Government employees earn supplementary income.

### Where To Go for More Information

Additional information on employment opportunities in the social sciences and related fields is given in the following publications:

Anthropology As a Career, Smithsonian Institution, Washington 25, D.C. Price 20 cents.

Career Opportunities as a Foreign Service Officer, U.S. Department of State Publication 7047, Washington 25, D.C. Free.

America's Helping Hand, International Cooperation Administration, Washington 25, D.C. Free.

Information on the respective branches of social science and on public administration may be obtained from the following professional organizations:

American Anthropological Association, 1530 P St. NW., Washington 5, D.C.

American Economic Association, Northwestern University, Evanston, Ill.

American Historical Association, 400 A St. SE., Washington 3, D.C.

American Political Science Association, 1726 Massachusetts Ave. NW., Washington 6, D.C.

American Sociological Association, New York University, Washington Square, New York 3, N.Y.

American Society for Public Administration, 6042 Kimbark Ave., Chicago 37, Ill.



## Anthropologists

(D.O.T. 0-36.01)

### Nature of Work

Anthropologists study primitive and civilized man—his origin, physical characteristics, customs, languages, traditions, material possessions, and social and religious beliefs and practices. Although the smallest group of the social scientists, anthropologists cover the widest range of subject matter.

Most anthropologists specialize in cultural anthropology—usually archeology or ethnology. *Archeologists* excavate the places where earlier civilizations are buried and reconstruct the history of the people who once lived there, by studying the remains of homes, tools, clothing, ornaments, and other evidences of human life and activity. For example, archeologists are digging in the Pacific Coast area between northern Mexico and Ecuador to find evidences of trade and migration in the pre-Christian Era. Some archeologists are excavating ancient Mayan cities in Mexico and restoring temples. Others are working in the river valley along the Rio Grande to salvage remnants of Indian villages and sites of early military forts and trading posts before the area is flooded by dams now under construction. *Ethnologists* may spend long periods living among primitive tribes or in other communities, to learn their

ways of life at first hand. The ethnologist takes detailed and comprehensive notes describing the social customs, beliefs, and material possessions of the people, usually learning their language in the process. He also collects examples of their tools, utensils, weapons, and other articles. Some cultural anthropologists specialize in linguistics, the scientific study of the sounds and structures of languages and of the historical relationships among languages.

A few people specialize as *physical anthropologists*. These anthropologists apply intensive training in human anatomy and biology to the study of human evolution, and to the scientific measurement of the physical differences among the races of mankind. Because of their knowledge of body structure, physical anthropologists are occasionally employed as consultants on such projects as the improvement of clothing sizes or the design of more comfortable furniture.

The principal function of anthropologists is college teaching, which in some schools may include the teaching of sociology or, less often, geography, as well as anthropology. Research is the major activity of a substantial number of anthropologists, including a large proportion of those employed in government and nonprofit organizations, as well as a good many in the teaching field. Others specialize in museum work, which generally combines management and administrative duties with field work and research on anthropological collections. A few are engaged primarily in consulting, writing, or other activities.

### Where Employed

More than a thousand people were employed as anthropologists in 1960. About a fifth of them were women—a higher proportion than in any other social science field. The majority are employed in colleges and universities. The Federal Government employed a considerable



Courtesy of Smithsonian Institution

*Anthropologist observing Indian method of food preparation.*

number, mainly in museums, in Government-supervised areas such as parks, and in technical aid programs. The Government agencies which employed the largest number of anthropologists were the Smithsonian Institution and the National Park Service. Many other Government agencies, including the Departments of Defense and of Health, Education, and Welfare, employed some members of the profession as consultants. State and local government agencies also employed some anthropologists, usually for museum work. A few were employed in private industry and nonprofit organizations.

### **Training and Other Qualifications**

Young people who are interested in careers in anthropology should obtain Ph. D. degrees. College graduates with bachelor's degrees can obtain only temporary positions and assistantships in the graduate departments where they are working for advanced degrees. A master's degree, plus field experience, is sufficient for many beginning professional positions, but promotion to top positions is generally reserved for those with the Ph. D. degree. In some colleges, only anthropologists holding the Ph. D. degree can obtain a permanent teaching appointment.

Some training in physical anthropology and archeology, as well as in the other main subdivisions of the field, is necessary for all anthropologists. Courses in linguistics (the scientific study of language) are also valuable. Undergraduate students may begin their field training in archeology by arranging, through their university department, to accompany expeditions as laborers. They may advance to supervisory positions in charge of the digging or collection of material and may finally take charge of a portion of the work of the expedition. Beginning ethnologists and linguists (as well as experienced ones) usually do their fieldwork alone, without direct supervision. Most anthropologists base their doctoral dissertations on data collected through field research; they are, therefore, experienced fieldworkers by the time they obtain the Ph. D. degree.

The choice of a graduate school is very important, since the beginning anthropologist usually gets his first job through the university from which he receives his advanced degree. Students interested in museum work should select a school which can provide experience in an associated museum having anthropological collections. Similarly, those interested in archeology should choose a university which offers opportunities for summer experience in archeological field work or should plan to attend an archeological field school elsewhere during their summer vacations.

### **Employment Outlook**

Expanding employment opportunities for anthropologists are anticipated during the 1960 decade.

The number of anthropologists in colleges and universities will probably rise substantially. Employment outside the teaching field is expected to rise slowly. Anthropologists will find some additional opportunities in museums and archeological research programs. They will also find some new openings in the field of mental and public health and in other community survey work. Hiring in other fields is likely to be limited largely to the replacement of personnel retiring or vacating their positions for other reasons.

Anthropologists holding the doctorate will probably have very favorable employment opportunities during the 1960's, since the number of new Ph. D.'s is expected to remain below the demand for additional anthropologists during this period. Graduates with only the master's degree, however, are likely to face persistent competition for professional positions in anthropology and may enter related fields of work. A few who meet certification requirements may qualify for high school teaching positions. Others may find jobs in public administration and in nonprofit organizations and civic groups, which prefer personnel with social science training as a general background. (Information on Earnings and Where To Go for More Information is given at the beginning of this chapter.)

## Economists

(D.O.T. 0-36.11)

### Nature of Work

Economists study the ways in which man makes a living and satisfies his material needs. They are concerned with the problems which arise in utilizing limited resources of land, raw materials, manpower, and manufactured products so as to meet, as well as possible, people's many unsatisfied wants. In this connection, they may analyze the relation between the supply of and demand for goods and services, and the ways in which goods are exchanged, produced, distributed, and consumed. Some economists are concerned with such practical problems as the control of inflation, the prevention of depression, and the development of farm, wage, tax, and tariff policies. Others develop theories to explain the causes of employment and unemployment or the ways in which international trade influences world economic conditions. Still others are engaged in the collection and interpretation of data on a wide variety of economic problems.

Economists are employed principally as teachers in colleges and universities, as research workers in government agencies and, to a lesser extent, in private industry and nonprofit research organizations. Those employed as college teachers guide students in learning the basic principles and methods of economics and also frequently engage in writing, lecturing, or consulting activities. They do much of the research on basic problems in economic theory and formulate many of the new theories and ideas which directly or indirectly influence economic thought in industry and government.

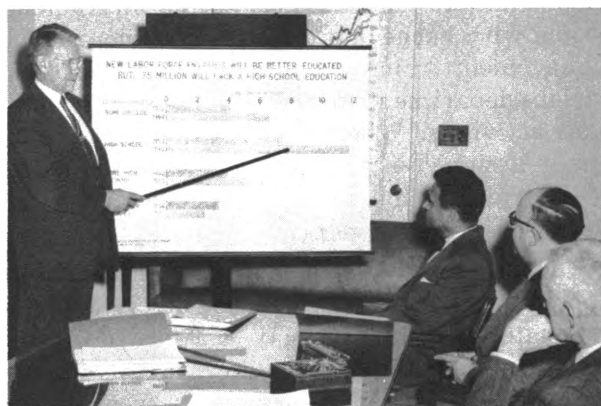
Most economists in the Federal Government are specialists in agricultural, business, labor, or fiscal economics, or in international trade and development. They may plan and carry out studies involving the collection of basic data in these fields, use these and other data to analyze the need for changes in government policy, write reports on their findings, and sometimes present these reports before policymaking bodies. In addition, many people with training

as economists are employed by the Federal Government as statisticians, foreign affairs specialists, intelligence specialists, and in administrative and other positions where a background in economics is important.

Economists employed by large business firms, including banks and other financial institutions do research and, in many cases, also have some administrative and consultative duties. They may concentrate on problems relating to domestic business conditions, markets and prices of company products, government policies affecting business, or international trade. Their main purpose is to provide management with information to be used in making decisions on problems such as the timing of new financing or the advisability of expanding the company's business by adding new lines of merchandise or by opening branch plants in new areas.

### Where Employed

Economics is the largest of the basic social science fields. About 20,000 people were employed primarily as economists in 1960. Of this number, about half were employed by colleges and universities; approximately a third worked for government agencies—chiefly Federal. A small but growing number of economists are employed by private industry and some serve in private research agencies and community organizations. A few economists are self-em-



Courtesy of U.S. Department of Labor

*Economists interpret their data for others.*

ployed, acting as consultants, mainly to business firms.

Economists are to be found in nearly all cities and university towns. The largest group, however, are in the Washington, D.C., area where most of those in the Federal Government are located. A good many American economists are employed in foreign countries, mainly by the International Cooperation Administration. Most economists in private industry are employed in the home offices of large corporations which are located chiefly in big cities—above all New York City and Chicago. These two cities also have the largest concentrations of economists in nonprofit research organizations.

### **Training and Other Qualifications**

All economists must have a thorough grounding in economic theory, economic history, and methods of economic analysis, including statistics. An increasing number of universities emphasize the value of mathematical methods of economic analysis and require candidates for graduate courses in such methods to be well trained in mathematics, including calculus.

A bachelor's degree with a major in economics is sufficient for many beginning research jobs in government and private industry, although persons employed in such jobs are not always regarded as professional economists. Since beginning jobs are ordinarily concerned mainly with the collection and compilation of data, a thorough knowledge of statistical procedures as well as economics is usually required. Industrial and business firms often hire young people with bachelor's degrees in economics as management trainees and rotate them through various departments to acquaint them with company activities. Whether or not the employee is finally assigned a job which makes specific use of his training in economics depends largely on the needs of the company.

The master's degree is generally required for appointment as a college instructor, though graduate assistantships may be awarded to outstanding students working toward their master's degree. In many large colleges and universities, completion of all the requirements for the Ph. D. degree, except the dissertation,

is necessary for appointment to the position of instructor. In government or private industry, economists with the master's degree can usually qualify for more responsible research positions than are open to those with only the bachelor's degree.

The Ph. D. degree is required for a professorship in a high-ranking college or university and is an asset in competing for other responsible positions in government, business, or private research organizations.

Economists interested in overseas assignments will find broad training in other social sciences, as well as advanced training in economics, very helpful. For most positions with the International Cooperation Administration, considerable experience is also required.

The choice of a graduate school is very important for people planning to become economists. Students interested in research should select schools which emphasize training in research methods and statistics and provide good research facilities, including opportunities for practical experience. Those who wish to work in the field of agricultural economics will find exceptional opportunities for part-time research work at State universities having agricultural experiment stations. Professors and chairmen of economics departments do much of the placement of beginning economists in teaching positions and in positions in industry and nonprofit research organizations.

### **Employment Outlook**

Employment opportunities for well-qualified economists will continue to increase during the 1960's, especially in the college teaching field. Colleges and universities will need hundreds of new instructors annually to handle rapidly increasing college enrollments and to fill positions vacated because of retirements, deaths, or transfers to other fields of work. In other fields of employment, opportunities for economists are likely to increase more slowly. However, many economists are likely to be required annually to meet expansion and replacement needs in industry, government, and nonprofit organizations. Private industry is expected to employ a growing number of economists, as business-

men become more accustomed to relying on scientific methods of analyzing business trends, forecasting sales, and planning purchasing and production operations. Employment of economists in State and Federal Government is likely to increase somewhat to meet the needs of government and industry for more extensive data collection and analysis as a guide to policy planning.

Economists with the doctorate are expected to have the best opportunities for employment. The number of new Ph. D.'s is likely to be considerably less than the number of new college instructors needed during the 1960's. As a result, employment opportunities for economists who have fulfilled all requirements for

the doctorate except the dissertation will also be very good. Although there may be considerable competition for professional positions among other economists with lesser qualifications—in view of the anticipated increase in their numbers—it is likely that most of those with graduate training will be able to find professional employment, especially if they have good training in statistics and mathematics. Those with only a bachelor's degree are likely to continue to face considerable competition for professional employment as economists. (Information on Earnings and Where To Go for More Information is given at the beginning of this chapter.)

## Historians

(D.O.T. 0-36.91)

### Nature of Work

Historians study the records of the past and write books and articles describing and analyzing past events, institutions, ideas, and people. They may use their knowledge of the past to explain current events. They may specialize in the history of a specific country or region, or in a particular period of time—ancient, medieval, or modern—or in economic, cultural, military, or other phases of history. More historians specialize in either United States history or in modern European history than in any other field. Some are experts in such areas as the development of various types of transportation (trains, cars, aircraft); others are specialists in art, architecture, or other objects of historical interest. The number of specialties in history is constantly growing. The history of business and the relation between technological changes and other aspects of historical development are among the newest fields.

Most historians are college teachers who also do some research, writing, and lecturing. Some, usually called archivists, specialize in identifying, preserving, and making available documentary materials of historical value. Others edit historical materials, prepare exhibits, write pamphlets and handbooks, and give talks for museums, special libraries, and historical socie-

ties. A few serve as consultants to editors and publishers and producers of materials for radio, television, and motion pictures. Historians employed in government mainly do research and administrative work in connection with research projects; they also prepare studies, articles, and books.

### Where Employed

An estimated 9,000 to 10,000 persons were employed as historians in 1960. This estimate does not include high school history teachers, who are usually classified as teachers rather than as historians although some have had considerable training in history.

Approximately 80 percent of the historians were employed in colleges and universities. Slightly less than 10 percent were employed in Federal Government agencies, principally the National Archives and the Departments of Defense, Interior, and State. Small but growing numbers were employed by other government organizations (State, local, and international), nonprofit foundations, research councils, special libraries, State historical societies, museums, and by large corporations.

Since history is taught in all institutions of higher education, historians are found in all

college communities. About half the historians in the Federal Government, including three-fourths of those working as archivists, are employed in Washington, D.C. Historians in other types of employment usually work in localities which have museums or libraries with collections adequate for historical research.

### Training and Other Qualifications

Graduate education is usually necessary for qualification as a historian. The master's degree in history is the minimum requirement for appointment to the position of college instructor, but in many colleges and universities, the Ph. D. degree is necessary for appointment. The doctorate is essential for attaining high-level college teaching, research, and administrative positions in the field of history. Most historians in the Federal Government and in nonprofit organizations have a Ph. D. degree or the equivalent in training and experience.

Although a bachelor's degree with a major in history is sufficient training for some beginning jobs in Federal, State, and local governments, persons in such jobs may not be regarded as professional historians. These beginning jobs are likely to be concerned with the collection of and preservation of historical data, so that a knowledge of archival work is helpful. An undergraduate major in history is often recommended by employing agencies for jobs in international relations and journalism.

### Employment Outlook

Employment of historians is expected to continue to increase substantially during the 1960 decade, chiefly in college teaching. Hundreds of new instructors will probably be needed annually to teach new classes made necessary by expanding enrollments, and to replace those who retire, die, or leave for other types of work. The number of positions for historians in archival work is also expected to rise, though more slowly than the number in college teaching. Only a slight rise is foreseen in the number of historians in other types of work.

Historians with doctorates are expected to have very good employment opportunities throughout the 1960 decade. Those with only the master's degree in history will probably encounter considerable competition for professional positions. College graduates with only the bachelor's degree will find it difficult to obtain employment as professional historians. On the other hand, history majors who meet certification requirements will find a good many openings in high school teaching. Some will also be able to qualify as trainees in administrative and management positions in government agencies, nonprofit foundations, civic organizations and, more rarely, in private industry. (Information on Earnings and Where To Go for More Information is given at the beginning of this chapter.)

## Political Scientists

(D.O.T. 0-36.96)

### Nature of Work

Political science is the study of government—what it is, what it does, and how and why. Political scientists are interested in government at every level—local, county, State, regional, national, and international. Many political scientists specialize in public administration, in American Government, or in international relations. Smaller numbers specialize in such fields as public law, history of political ideas, political parties, public opinion, and area studies.

Political scientists are most frequently employed as college teachers, sometimes teaching other social sciences as well as political science. They may combine research, consultation, or administrative duties with their teaching. Some teach in foreign universities where they prepare students for careers in public administration and assist in the development of training programs for government personnel. A good many political scientists are engaged mainly in research. They may make surveys of public opinion on political questions for

private research organizations. They may make studies of proposed legislation for state or municipal legislative reference bureaus or congressional committees to determine whether the legislation is well drafted and constitutional. They may analyze the operations of government agencies or specialize in foreign affairs research, either for government or nongovernment organizations. Still others are engaged in administrative or managerial duties in all fields of work. For example, they may be employed as budget analysts, as personnel directors or assistants, as city planners or managers, as legislative aids to congressmen, and as staff members of congressional committees.

### **Where Employed**

There were probably more than 10,000 political scientists in 1960. Most political scientists are employed in colleges and universities or in government agencies. Fewer than 10 percent work for other types of employers such as municipal and other research bureaus, civic and taxpayers associations, and large business firms.

Political scientists are employed in nearly every college in the United States, since courses in political science and government are widely taught. Most other political scientists are located in Washington, D.C., in other large cities, or in State capitals. A good many are employed in overseas jobs mainly by the U.S. Department of State, International Cooperation Administration, and the U.S. Information Agency.

### **Training and Other Qualifications**

Graduate training is generally required for professional employment in political science. College graduates with a master's degree in public administration can qualify for various administrative and research positions in government and in nonprofit research and civic organizations. More than 100 colleges and universities offer graduate training in a wide range of topics in the field of public administration—for example, city planning, municipal administration, criminal investigation, and social security administration. A majority of

these schools provide field training, and many offer internships which enable the student to obtain experience in government work. A good many universities award graduate degrees in international relations, foreign service, and area studies, as well as political science in general. A master's degree in any of these fields is very helpful in obtaining a position in a Federal Government agency concerned with foreign affairs. However, for some jobs, such as those with the International Cooperation Administration, only persons with substantial experience (preferably in public administration in the government) are hired.

Completion of all requirements for the Ph. D. degree, except the doctoral dissertation, is the usual prerequisite for appointment as a college instructor. The Ph. D. degree is generally required for advancement to the position of professor.

Some young people with only a bachelor's degree in political science qualify as trainees for administrative jobs, such as budget analyst, personnel assistant, or investigator in government or industry. However, they must compete for these jobs with college graduates majoring in many other fields, particularly those with majors in business administration, accounting, economics, and other social science specialties. A great many students with the bachelor's degree in political science go on to study law; many others obtain graduate training in public administration, international relations, or other specialized branches of political science.

### **Employment Outlook**

Employment of political scientists is expected to continue to increase rapidly during the 1960 decade. The largest increase will be in colleges and universities. However, the number of political scientists in administrative jobs in government agencies will probably rise also because of a growing recognition of the value of specialized training in public administration. Government agencies concerned with foreign affairs will continue to employ a good many political scientists. A slow growth is anticipated in employment of political scientists in private industry. No substantial change is fore-

seen in the number of political scientists in other types of work.

Many more political scientists will be needed to fill positions vacated because of retirements, deaths, or transfers to other fields of work. Altogether, colleges and universities may need 400 to 500 new political scientists annually during the 1960's, both to fill new positions and to meet replacement needs. Government agencies will need several hundred more each year.

Political scientists with the doctorate will find very good opportunities in college teaching and good chances for employment in other fields as well. Those who have completed all the requirements for the doctorate except the dissertation are also likely to find favorable opportunities in college teaching. Employment opportunities for others with the master's de-

gree will be more limited, but many openings will be available to them in Federal, State, and municipal government agencies; research bureaus; political organizations; and civic and welfare agencies. For new graduates with only the bachelor's degree, opportunities for professional employment in the political science field will probably continue to be limited. However, those planning to continue their studies in law, foreign affairs, journalism, and other related fields will find their political science background very helpful. Some who meet State certification requirements will enter high school teaching.

(Information on Earnings and Where To Go for More Information is given at the beginning of this chapter.)

## Sociologists

(D.O.T. 0-36.31)

### Nature of Work

Sociologists study the many groups which man forms—families, tribes, communities, villages, and states, and a great variety of social, religious, professional, business, and other organizations which have arisen out of living together. They study the behavior of these groups, trace their origin and growth, and analyze the influence of group activities on individual members. Some sociologists are primarily concerned with the characteristics of particular kinds of social groups and institutions; others are more interested in the ways in which individuals are affected by groups to which they belong. Many sociologists specialize in the study of social organization, social psychology, or rural sociology. Others specialize in intergroup relations, family problems, social effects of urban living, population studies, or analyses of public opinion. Some sociologists concentrate on research methodology or the conduct of surveys. Growing numbers are concerned with the application of sociological knowledge and methods in the areas of penology and correction, education, human relations in industry, and regional and community planning. Some specialize in medical sociology—studying

the social factors which affect mental or public health or the problems of hospital administration. The topics in which sociologists specialize are too many and varied to be fully listed here.

Most sociologists are college teachers, but, as a rule, these teachers also do research work. In addition, many sociologists are employed full time in research by big companies, government agencies, and research bureaus connected with universities, welfare agencies, and other non-profit organizations.

Sociological research may involve the collection of data (often through personal interviews), the preparation of case studies, administration of tests, carrying out of statistical surveys, and laboratory experiments. Sociologists may make studies of individuals, families, or communities in an attempt to discover the causes of social problems—such as crime, juvenile delinquency, alcoholism, poverty, and dependency—the normal pattern of family relations, or the different patterns of living in communities of varying types and sizes. They may collect and compile data from official government sources and make statistical analyses to show the trends in population, including changes in age, sex,



race, and other population characteristics; and also the extent of population movement among rural, suburban, and urban areas and among different geographic areas. Some sociologists specialize in conducting surveys, either those which add to basic sociological knowledge or those in such applied fields as public opinion research, marketing and advertising research. Still others are specialists in the use of mass communication facilities, including radio, television, newspapers, magazines, and circulars.

Sociologists are frequently administrators—supervising research projects or the operation of social agencies, including marriage and family clinics. Some people with sociological training are recreation workers, case workers, prison inmate classification officers, or probation and parole officers. Other sociologists act as consultants, advising on such diverse problems as the management of hospitals for the mentally ill, the rehabilitation of juvenile delinquents, or the development of effective advertising programs to promote public interest in particular products.

### Where Employed

It is roughly estimated that about 6,000 or 7,000 persons were professionally employed as sociologists in 1960. Numerous other persons were employed in positions requiring some training in this field, including many in social, recreation, and public health work.

Approximately three-fourths of the sociologists—people in research and administrative positions, as well as teachers—were employed in colleges and universities in 1960. About one-tenth were in Federal, State, local, or international government agencies; about 5 percent were working in private industry or were self-employed; and the remainder were in welfare or in other nonprofit organizations.

Since sociology is taught in most institutions of higher learning, sociologists may be found in nearly all college communities. They are most heavily concentrated, however, in large colleges and universities which offer graduate training in sociology and opportunities for sociological research in a research bureau. Medical sociologists are most often employed

on the teaching or research staff of medical colleges and graduate departments of public health and preventive medicine. They also find employment on hospital staffs and in State and municipal health departments. Rural sociologists most frequently work at State universities, because they are likely to have exceptional opportunities for research at the State agricultural experiment stations attached to these universities. Some specialists in rural sociology and community development are employed in foreign countries, by U.S. Government agencies and private foundations.

### Training and Other Qualifications

At least a master's degree with a major in sociology is usually required for employment as a sociologist. The Ph. D. degree is frequently required for employment in the better positions and virtually always for the most responsible positions.

Young people with only a bachelor's degree in sociology are not considered qualified for professional employment, although they may be able to secure routine jobs in this or related fields where a knowledge of sociology is helpful. They may get jobs as interviewers or as research assistants working under close supervision. A good many are employed as case workers, counselors, recreation workers, or administrative assistants in public and private welfare agencies. As a rule, however, welfare agencies prefer persons with specific training in social work. Sociology majors with sufficient training in statistics may obtain positions as beginning statisticians. Those who meet local certification requirements may enter high school teaching.

Sociologists with master's degrees may qualify for many administrative and research positions, provided they are trained in research methods and statistics. They may perform work requiring responsibility for specific portions of a survey or for the preparation of analyses and reports under general supervision. As they gain experience, they may advance to supervisory positions in both public and private agencies. Sociologists with the master's degree may also qualify for some college in-

structorships. Most colleges, however, will appoint as instructors only people with training beyond the master's level—frequently the completion of all requirements for the Ph. D. degree except the doctoral dissertation. Outstanding graduate students often get teaching or research assistantships while completing their training for the Ph. D. degree.

The Ph. D. degree is essential for attaining a professorship in most colleges or universities and is commonly required for sociologists who direct major research projects, hold important administrative positions, or act as consultants.

The choice of a graduate school is very important for people planning to become sociologists. Students interested in research should select schools which emphasize training in research methods and statistics and provide opportunities to gain practical experience in research work. Professors and chairmen of sociology departments frequently aid in the placement of graduates.

### **Employment Outlook**

Employment opportunities for sociologists are expected to continue to increase substantially during the 1960's. Most of the new positions will be in college teaching because of expanding college enrollments. Perhaps as many as 300 new sociology teachers will be

needed each year, on the average, to fill new positions and to replace college faculty members who leave the profession. A moderate rise in the number of sociologists in nonteaching fields is also anticipated.

Sociologists well trained in research methods and advanced statistics will have the widest choice of jobs. Employment opportunities are expected to be better than average for research workers in rural sociology, community development, population analysis, public opinion research, and in various branches of medical sociology. Employment opportunities will also increase markedly in other applied fields, such as the study of juvenile delinquency and educational sociology.

The number of sociologists with the doctor's degree is expected to rise less rapidly than demand during the 1960's. As a result, employment opportunities for both Ph. D.'s and those who have completed all requirements for the doctorate except the dissertation will probably be very good during this period. Inexperienced graduates with only the master's degree—with the exception of those specifically trained in research methods—will probably continue to face considerable competition for positions as professional sociologists. (Information on Earnings and Where To Go for More Information is given at the beginning of this chapter.)

## THE CLERGY

The choice of the ministry, priesthood, or rabbinate as one's lifework involves considerations that do not influence to the same degree the selection of a career in most other occupations. When young people decide to become clergymen, they do so primarily because of their religious faith and their desire to help others. Nevertheless, it is important for them to know as much as possible about the profession and how to prepare for it, the kind of life it offers, and its needs for personnel. They should understand also that the civic, social, and recreational activities of clergymen are often influenced, and sometimes restricted, by the customs and attitudes of their community.

The number of clergymen needed is broadly related to the size and geographic distribution of the Nation's inhabitants and their participation in organized religious groups. These factors affect the number of churches and synagogues that are established and, thus, the number of pulpits to be filled. In the past two decades, there has been a sharp rise in church and synagogue membership. More than 112 million people in the United States were members of organized religious groups in 1959—representing more than 60 percent of the total population, whereas in 1940 slightly less than half the population belonged to religious groups. In addition to those who serve congregations, many clergymen teach in seminaries and other educational institutions, serve as missionaries, and perform various other duties in meeting their religious responsibilities.

Young people considering a career as a clergyman should seek the counsel of a religious leader of their faith to aid them in evaluating their qualifications for the profession. Besides a desire to serve the spiritual needs of others and to lead them in religious activities, they will need a broad background of knowledge and the ability to speak and write clearly. Emotional stability is necessary, since a clergyman must be able

to help others in times of stress. Furthermore, young people should know that clergymen are expected to be examples of high moral character.

The amount of income clergymen receive depends, to a great extent, on the size and financial status of the congregation they serve and usually is highest in large cities or in prosperous suburban areas. Earnings of clergymen, as of most other professional groups, usually rise with increased experience and responsibility. Most Protestant churches and a number of Jewish congregations provide their spiritual leaders with housing. Roman Catholic priests ordinarily live in the rectory of a parish church or are provided lodgings by the religious order to which they belong. Many clergymen receive allowances for transportation and other expenses necessary in their work. Clergymen often receive gifts or fees for officiating at special ceremonies such as weddings and funerals. In some cases, these gifts or fees are an important source of additional income; however, they are frequently donated to charity by the clergymen.

More detailed information on the clergy in the three largest faiths in the United States—Protestant, Roman Catholic, and Jewish—is given in the following statements which were prepared in cooperation with leaders of these faiths. Information on the clergy in other faiths may be obtained directly from leaders of the respective groups. Numerous other church-related occupations—those of the missionary, recreation leader, teacher, director of youth organizations, editor of religious publications, music director, church secretary, and many others—offer interesting and satisfying careers. In addition, opportunities to work in connection with religious activities are present in many other occupations. Clergymen or educational directors of local churches or synagogues can provide information on the church-related occupations and other areas offering opportunities for religious service.

## Protestant Clergymen

(D.O.T. 0-08.)

### Nature of Work

Protestant clergymen lead their congregations in worship services and may administer the rites of baptism, confirmation, and Holy Communion. They prepare and deliver sermons and give other talks; instruct people who are to be received into membership of the church; perform marriages; and conduct funerals. They counsel individuals who seek guidance, visit the sick and shut-in, comfort those who are bereaved, and serve their church members in many other ways. Protestant ministers may also write articles for publication and engage in interfaith, community, civic, educational, and recreational activities sponsored by or related to the interests of the church. A few clergymen teach in seminaries, colleges, and universities.

The types of worship services which ministers conduct differ among Protestant denominations and also among congregations within a denomination; in some denominations, ministers follow a traditional order of worship, whereas in others they adapt the services to different occasions. Most of these services include Bible reading, hymn singing, prayers, and a sermon. Bible reading by a member of the congregation and individual testimonials may constitute a large part of the service in some denominations.

Ministers serving small congregations generally work on a close personal basis with their parishioners. Those serving large congregations usually have greater administrative responsibilities and spend considerable time working with committees, church officers, and staff, besides performing their other duties. They may have one or more associates or assistants who share specific aspects of the ministry, such as the Ministers of Education whose work is principally with young people.

### Where Employed

In 1959, more than 215,000 people were serving as ministers of churches, composing over 225 Protestant denominations or other

groups. In addition, thousands of ordained clergymen were in other occupations—many closely related to the ministry. The greatest numbers of clergymen are affiliated with the four largest groups of churches—Baptist, Methodist, Lutheran, and Presbyterian—to which about 7 out of every 10 of the 62 million Protestant church members belong. Most ministers serve individual congregations; some are engaged in missionary activities in the United States and in foreign countries; others serve as chaplains in the Armed Forces, in hospitals, and in other institutions; still others teach in educational institutions, engage in other religious educational work, or are employed in social welfare and related agencies. Less than 5 percent of all ministers are women; however, about 80 denominations ordain women. In addition, in some denominations an increasing number of women who have not been ordained are serving as pastors' assistants.

All cities and most towns have one or more Protestant churches with a full-time minister. The majority of ministers are located in cities and towns. Many others live in less densely populated areas where each may serve the religious needs of two or more congregations in different communities. A larger proportion of Protestants than members of other faiths live in rural areas.

### Training and Other Qualifications

The educational preparation required for entry into the ministry has a wider range than that for most professions. Some religious groups have no formal educational requirements, and others ordain persons who have received varying amounts of training in liberal arts colleges, Bible colleges, or Bible institutes. An increasingly large number of denominations, however, require a 3-year course of professional study in theology following college graduation. After completion of such a course in a theological school, the degree of bachelor of divinity or sacred theology is awarded.

Eighty-two of the many theological institu-

tions in the Nation in mid-1960 were accredited by the American Association of Theological Schools. Accredited institutions admit only students who have received the bachelor's degree, or its equivalent, from an approved college. In addition, certain character and personality qualifications must be met, and endorsement by the religious group to which the applicant belongs is required. The American Association of Theological Schools recommends that pre-seminary studies be concentrated in the liberal arts. Although courses in English, philosophy, and history are considered especially important, the pre-theological student should take courses also in the natural and social sciences, religion, and foreign languages. The standard curriculum recommended for accredited theological schools divides the course of studies into four major fields: Biblical, historical, theological, and practical. There is a trend toward adding more courses in psychology, pastoral counseling, sociology, religious education, administration, and other studies of a practical nature. Many accredited schools require that students gain experience in church work under the supervision of a faculty member or experienced minister. Some institutions offer the master of theology and the doctor of theology degrees to students completing 1 or more years of additional study.

In general, each denomination has its own schools of theology which reflect its particular interests and needs; however, some of these schools are open to students from various denominations. Several nondenominational schools associated with universities give graduate training covering a wide range of theological points of view.

Among the personal qualifications which most denominations seek in a candidate for the ministry are a deep religious conviction, a sense of dedication to Christian service, a genuine concern for and love of people, a wholesome personality and high moral and ethical standards, and a vigorous and creative mind. Because of the demands of the ministry, good health is a valuable asset.

Persons who have met denominational qualifications for the ministry are usually ordained following graduation from a seminary. In denominations which do not require seminary

training, clergymen are ordained at various appointed times. Clergymen often begin their careers as pastors of small congregations or as assistant pastors in large churches. Protestant clergymen in many of the larger denominations—especially those groups which have a well-defined church organization—often are requested to serve in positions of great administrative and denominational responsibility.

### Outlook

Shortages of Protestant ministers have persisted in the postwar period and are likely to continue through the mid-1960's. However, not all Protestant denominations will have equal difficulty in filling vacant pulpits. Some denominations will probably have a sufficient number of people who are qualified to serve as ministers. Generally, those denominations which require many years of formal training to qualify for the ministry are having the greatest difficulty in filling the needs of all their churches, and this situation is likely to persist. Although total enrollment in Protestant theological schools has increased substantially in the past few years, the number of students graduated annually probably will not be sufficient to replace the thousands of ministers who retire or die each year, to meet the needs of newly established congregations, and to supply assistant pastors where needed.

Many congregations—mainly those in rural areas—did not have a full-time ordained minister in 1960. Some had to rely on the services of theological students or shared the services of a pastor with another congregation. Many large congregations were unable to fill openings for assistant pastors. In addition, ordained ministers were being sought to serve in foreign missions, in religious educational activities, and as chaplains in the Armed Forces and in hospitals, penitentiaries, and other institutions.

Over the long run, the total number of ministers needed by Protestant churches will become larger as a result of the expected increase in population and in the number of congregations. The greatest expansion is anticipated in the suburbs of large cities. The increasing opportunities for ministers in fields such as tele-

vision and radio, youth and family relations work, the campus ministry, and religious activities including chaplaincies in institutions and industry, also point toward a need for additional clergymen. Replacement of those removed from the ranks by death, retirement, or other causes will also require an ever-increasing number of newly trained ministers.

### Where To Go for More Information

Young people who wish to enter the Protestant ministry should seek the counsel of a minister or church guidance worker. Additional information on both the ministry and other church-related occupations are also available from many denominational offices. Information on admission requirements may be obtained directly from each theological school.

## Roman Catholic Priests

(D.O.T. 0-08.)

### Nature of Work

Roman Catholic priests attend the spiritual, moral, and educational needs of the members of their Church. Their duties include offering the Sacrifice of the Mass; hearing confessions; administering the Sacraments; visiting and comforting the sick; conducting funeral services and consoling survivors; counseling those in need of guidance; and assisting the poor. Priests give religious instruction at Mass in the form of a sermon. They have numerous other responsibilities to assure that all laws of the Church are fulfilled.

Priests spend long hours performing services to the Church and the community. Their day usually begins with morning Mass and may end with an evening visit to the local hospital or the hearing of confessions. In addition, each day priests spend several hours in prayer and reading their breviaries. Many of them serve on Church committees or in civic organizations and assist in community projects. Various societies that carry on charitable and social programs also depend upon priests for direction.

Although all priests have the same powers acquired through ordination by a bishop, they are classified in two main categories—diocesan and religious—by reason of their way of life and the type of work to which they are assigned. Diocesan priests (sometimes called secular priests) generally work as individuals in the parishes to which they are assigned by the bishop of their diocese. Religious priests are members of religious orders—for example Jesuits, Dominicans, or Franciscans—and gen-

erally work as members of a community in specialized activities, such as teaching or missionary work, assigned to them by the superiors of the orders to which they belong.

Both religious and secular priests hold teaching and administrative posts in the Catholic seminaries, universities and colleges, and high schools. Priests attached to religious orders staff a large proportion of the institutions of higher education and many high schools, whereas secular priests are primarily concerned with the parochial schools attached to parish churches and with diocesan high schools. The members of religious orders do most of the missionary work conducted by the Catholic Church in this country and in the foreign field.

### Where Employed

More than 53,000 priests served about 40 million Catholics in the United States in 1960. There are priests in nearly every city and town and in many rural communities; however, the majority are in heavily populated metropolitan areas, where most of the Catholic population is located. Catholics are concentrated in the Northeast and the Great Lakes regions, with smaller concentrations in California, Texas, and Louisiana. A large number of priests are located in communities near Catholic educational and other institutions. Many are stationed throughout the world as missionaries. Others travel constantly on missions to local parishes throughout the country. Some priests serve as chaplains with the Armed Forces or in hospitals or other institutions.

### Training and Other Qualifications

The course of study for the priesthood takes at least 8 years after graduation from high school. Most students take this training in theological seminaries—first, in a minor seminary (usually for 2 years), then in a major seminary which offers 6 years of advanced training. In 1960, almost 40,000 students, known as seminarians, were enrolled in 525 seminaries in the United States. High school graduates with the desired scholastic background—an academic course, including Latin—can complete the minor seminary in 2 years and then advance to the major seminary. Elementary school graduates may enter the minor seminary where they complete their high school work before taking the 2 years of college level work. Courses include Christian doctrine, Latin, Greek, English, at least one other modern language, rhetoric and elocution, history, geography, bookkeeping, mathematics, natural sciences, and Gregorian chant.

At the major seminary, the first 2 years are devoted to the study of philosophy, scripture, church history, and the natural sciences as related to religion. During the remaining 4 years, the course of study includes sacred scripture; apologetics; dogmatic, moral, and pastoral theology; homiletics; church history; liturgy; and canon law. Diocesan and religious priests attend different major seminaries, where slight variations in the training reflect the differences in the type of work expected of them as priests. During the later years of his seminary course, the candidate receives from his bishop a succession of orders culminating in his ordination to the priesthood.

Most postgraduate work in theology is taken either at Catholic University of America (Washington, D.C.) or at the ecclesiastical universities in Rome. Many priests also do graduate work at other universities in fields unrelated to theology. Priests are commanded by the law of the Catholic Church to continue their studies, at least informally, after ordination.

Young men are never denied entry into seminaries because of lack of funds. In seminaries for secular priests, the bishop may make arrangements for loans to the students. Those

in religious seminaries are often financed by contributions of benefactors.

Among the qualities considered most desirable in candidates for the Catholic priesthood are a love of and concern for people, a deep religious conviction, a desire to spread the Gospel of Christ, at least average intellectual ability, capacity to speak and write correctly and fluently, and more than average skill in working with people. Candidates for the priesthood must understand that priests are not permitted to marry and are dedicated to a life of chastity.

The first assignment of a newly ordained secular priest is usually that of assistant pastor or curate. Newly ordained priests of religious orders are assigned to the specialized duties for which they are trained.

### Outlook

A growing number of priests will be needed in the years ahead to provide for the spiritual and educational needs of the rising number of Catholics in the Nation. Although the number of seminarians has increased steadily since World War II, the number of ordained priests has not been sufficient to fill the needs of newly established parishes and expanding colleges and other Catholic institutions, and to replace priests who die. Priests usually continue at their work longer than persons in other professions, but the varied demands and long hours create a need for young priests to assist the older ones. Also, an increasing number of priests have been serving in many diverse areas—for example, religious radio and television work and labor-management mediation. Continued expansion of such activities, in addition to the expected further growth in Catholic population, will require a steady increase in the number of priests, both in the next few years and over the long run.

### Where To Go for More Information

Young men interested in entering the priesthood should seek the guidance and counsel of their parish priest. Additional information regarding different religious orders and the secu-

lar priesthood, as well as a list of the various seminaries which prepare students for the

priesthood, may be obtained from Diocesan Directors of Vocations.

## Rabbis

(D.O.T. 0-08.)

### Nature of Work

Rabbis are the spiritual leaders of their congregations and teachers and interpreters of Jewish law and tradition. They conduct daily services and hold special services on the Sabbath and on holidays. Rabbis are customarily available at all times for counsel to members of their congregations, other followers of Judaism, and the community at large. Many of the rabbis' functions—preparing and delivering sermons, performing wedding ceremonies, visiting the sick, conducting funeral services, comforting the bereaved, helping the poor, supervising religious education programs, engaging in interfaith activities, assuming community responsibilities, and counseling individuals—are similar to those performed by clergymen of other faiths. Rabbis may also write for religious and lay publications, and teach in theological seminaries, colleges, and universities.

Rabbis serve congregations affiliated with one of the three branches of American Judaism—Orthodox (traditional), Conservative, or Reform (liberal). Regardless of their particular point of view, all Hebrew congregations preserve the substance of Jewish religious worship. The congregations differ in the extent to which they follow the traditional form of worship—for example, in the wearing of head coverings or in the use of Hebrew as the language of prayer, or in the use of music. Because of these differences, the format of the worship service and therefore the ritual that the rabbis use may vary even among congregations belonging to the same branch of Judaism.

### Where Employed

About 4,300 rabbis served more than 5 million followers of the Jewish faith in this country in 1960. Most are Orthodox rabbis; the rest are about equally divided between the

Conservative and Reform branches of Judaism. Most rabbis act as the spiritual leaders of individual congregations; some serve as chaplains in the Armed Forces and in hospitals; others teach either full or part time in private educational institutions; and others are employed in social welfare agencies and in religious education work for such organizations as the Hillel Foundation.

Although rabbis serve Jewish communities throughout the Nation, they are concentrated in those States which have sizable Jewish populations. In 1959, six States (New York, California, Pennsylvania, New Jersey, Illinois, and Massachusetts) had about four-fifths of the estimated total Jewish population in the United States.

### Training and Other Qualifications

To become eligible for ordination as a rabbi, a student must complete the prescribed course of study at a Jewish theological seminary.

Entrance and training requirements depend upon the branch of Judaism with which the seminary is associated. The Hebrew Union College-Jewish Institute of Religion (Reform) and The Jewish Theological Seminary of America (Conservative) are the only seminaries that train rabbis for their respective branches of Judaism. Both schools require the completion of a 4-year college course, as well as prior preparation in Jewish studies, for admission to the rabbinic program leading to ordination. Although 5 years are normally required to complete the rabbinic course at the Reform seminary, exceptionally well-prepared students can shorten this period of study to a minimum of 3 years. The course at the Conservative seminary can be completed in 4 years if the student has a strong background in Jewish studies; otherwise, the course may take as long as 6 years.



Several seminaries train Orthodox rabbis. These schools have programs of various lengths, all leading to ordination. At one of the larger Orthodox seminaries, well-qualified students who are college graduates may complete the rabbinic program in 3 years; however, students who are not college graduates may spend a longer period at this seminary and complete the requirements for the bachelor's degree at the same time they are pursuing the rabbinic course. Some Orthodox seminaries, however, do not require a college degree to qualify for ordination.

In general, the curriculums of Jewish theological seminaries provide students with a comprehensive grasp of all aspects of Jewish knowledge, including the Bible and Talmud (Jewish civil and canonical law). Other courses include Jewish history, theology, pastoral psychology, and public speaking. The Reform seminary places less emphasis on the study of Talmud and offers a broad course of study that includes such subjects as human relations and Jewish religious education. Some seminaries grant advanced academic degrees in such fields as Talmudic and Biblical research. All Jewish theological seminaries make scholarships and loans available to students.

Newly ordained rabbis usually begin as leaders of small congregations, as assistants to experienced rabbis, or as chaplains in the Armed Forces. As a rule, the pulpits of large and well-established synagogues and temples are filled by experienced rabbis.

The choice of a career as a rabbi should, of course, be made on the basis of a fervent belief in the religious teachings and practices of Judaism and of a desire to serve the religious needs of others. In addition to having high moral and ethical values, the prospective rabbi should have good judgment and be intelligent and able to write and speak effectively.

### Outlook

The number of rabbis in this country will probably not be sufficient to meet the needs of

all congregations and other organizations desiring their services during the 1960's. At the beginning of the decade, many congregations—especially those located in States where there are relatively few persons of the Jewish faith—could not secure the spiritual leadership of a full-time ordained rabbi and had to rely on the services of senior theological students and lay readers. Rabbis were also being sought to lead the many new congregations which had been organized in and around New York, Chicago, Los Angeles, Philadelphia, and Boston—where the majority of the Jewish population is concentrated.

The striking increases since World War II in Jewish religious affiliation and in the number of synagogues and temples seem likely to continue. Furthermore, an increasing demand for rabbis to work with social welfare and other organizations connected with the Jewish faith is anticipated.

Although the number of students graduating annually from the Jewish theological seminaries is expected to increase also, there will probably not be enough new graduates to replace the rabbis who retire or die, and to fill the openings which will be created by the formation of new congregations. Immigration, once an important source of supply of rabbis, is no longer significant. In fact, graduates of American seminaries are now in demand for Jewish congregations in other countries.

### Where To Go for More Information

Young people who are interested in entering the rabbinate should seek the guidance of a rabbi. Additional information on how to prepare for service in the rabbinate of a particular branch of Judaism, including school admission requirements, may be obtained from each theological school.

# BUSINESS ADMINISTRATION AND RELATED PROFESSIONS

People employed in the field of business administration are a large group and an extremely important one. The success or failure of a business enterprise probably depends more on how well its managers do their job than it does on anything else. Business managers are also one of the fastest growing groups in our country. During the 5 years between 1955 and 1960, the number of salaried management workers increased four times as fast as the number of workers in all nonagricultural occupations combined.

Management workers do the same kinds of things that the owner of a small business does for himself in order to keep his business running, but they do them on a much bigger scale. The man who runs a small television repair service, for example, may attempt to attract new customers through advertisements which he writes and places in the classified pages of local papers. The workers in charge of advertising household appliances produced by a large manufacturing company may use newspaper advertisements also, but their firm's advertisements are likely to be bigger and more elaborate and published in newspapers throughout the country. Their company's products will probably be advertised also through radio, television, and other channels. Similarly, the small businessman has, at most, only a few employees to direct, whereas the personnel workers in a large corporation must consider the welfare and productiveness of thousands of employees.

In 1960, there were around 3 million people in salaried management positions with private firms. In addition, many more thousands were employed as supervisors, and as engineers and other professional specialists whose work involved managerial responsibilities.

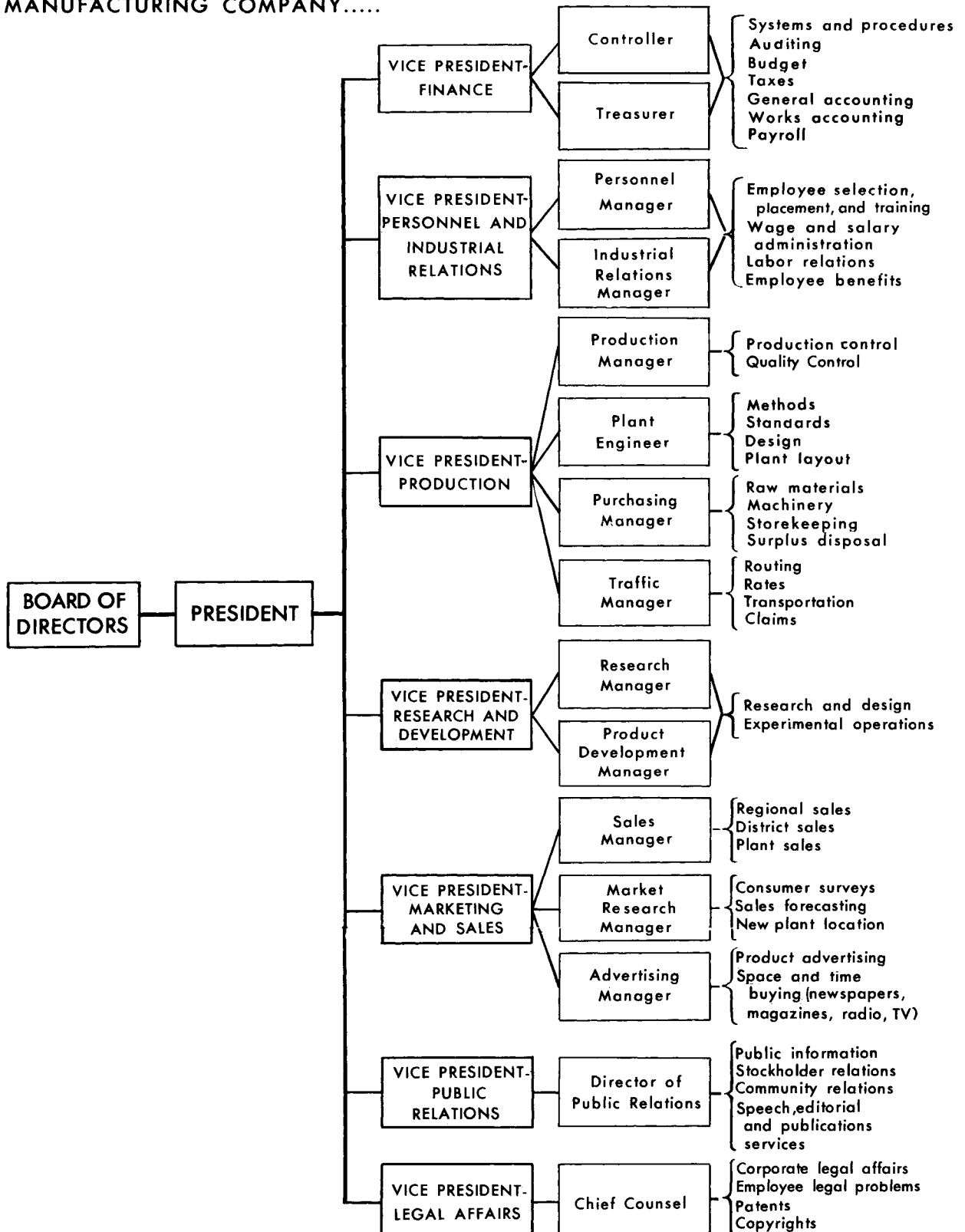
At the top of the management ladder are the corporation presidents, vice presidents, and other company officials. These are the people

who set company goals, coordinate company activities, and make the major decisions which establish companywide policies. In small companies, they may also carry through with the plans which they develop, taking direct charge of the work done in connection with store displays, financial reports, employee recreational activities, or other projects. In large corporations, however, the plans and policies developed by officials at the top are more likely to be carried out with the assistance of management workers in subordinate positions. Usually, there is at least one level of subordinate management position—the middle-level managers who direct the work of sales, accounting, personnel, engineering, and other departments. (See chart 18 illustrating how management functions might be organized within a large company.) Companies with branch plants and chain stores, have middle-level managers in charge of these operations as well. Many companies also recognize a second subordinate level of management—supervisory positions which involve management responsibilities. Middle-level managers, as well as supervisors in positions of this kind, are responsible for keeping the units under their direction operating at peak efficiency and in accordance with the broad policies established for the company as a whole.

At the bottom of the management ladder are the beginners who are gaining experience which will later qualify them for management positions. Many are college graduates who have been recruited by their companies because their ability, personality traits, and training make them promising candidates for managerial work. Such trainees are placed usually in jobs where they have particularly good opportunities to become acquainted with the firm's business activities and policies. Some work as assistants to people in management positions, while others are given job assignments which

CHART 18

**SAMPLE ORGANIZATION CHART OF A LARGE MANUFACTURING COMPANY.....**



are changed periodically so that they may have an opportunity to learn all phases of their employer's business operations. A limited number go through formal executive trainee programs.

The number of companies which undertake formal recruitment and training programs, and the number of people who get their start as management trainees are relatively small. Most people in the field of business administration enter their jobs only after several years of work experience, often with the same employer but in work unrelated to management. This kind of experience gives the manager-to-be an opportunity to acquire the knowledge of business practices and problems he will need. It also enables his employer to observe whether he possesses the maturity, judgment, and leadership qualities which are essential if he is to be effective in planning and directing company activities. Today, more and more employers are seeking to develop the qualities which make for successful management through company-sponsored training programs which are open to carefully selected groups of employees.

Private industry's increasing dependence on trained management specialists plus the economic growth which is anticipated during the next decade point towards the likelihood that employment in this field of work will expand very considerably during the 1960's. Openings for newcomers will arise also because of the need to fill positions which become vacant as management workers retire or leave their jobs

for other reasons. Altogether, the number of management positions in private industry which will have to be filled can be expected to reach 150,000 or more per year in the 1960-70 decade. Most of them will be filled by people who have already acquired a substantial amount of experience in other phases of their employer's operations or by outsiders with work experience related to the positions to be filled. Opportunities for many young people to start on the road to a career in business management will be provided, however, as the entry jobs farther down on the ladder are vacated by people who move up to better positions.

This chapter gives information about several of the principal occupations related to the management of private business enterprises. In the case of occupations in which there are substantial numbers of government employees, information about government service is included. Other occupations in the field of business management, which are not described here but are discussed elsewhere in this Handbook, include Hotel Manager, Restaurant Manager, and Bank Officer. Engineers, Chemists, and other scientists, who often carry management responsibilities, are also discussed elsewhere in this Handbook. Still other fields of business management are referred to in the statements on Sales Occupations, Radio and Television Broadcasting Occupations, and various manufacturing industries. (See index for page numbers.)

## Accountants

(D.O.T. 0-01.)

### Nature of Work

Accounting is the second largest field of professional employment for men. In 1960, more than 400,000 accountants and auditors were engaged in professional accounting work, including about 70,000 certified public accountants (CPA's) who had passed rigorous examinations and met educational and experience requirements prescribed by law in their State. Fewer than 10 percent of all accountants, and 2 percent of the CPA's, were women.

Accountants compile and analyze business records and prepare financial reports, such as profit and loss statements, balance sheets, cost studies, and tax reports. The major fields of employment are public, private, and government accounting. Public accountants are independent practitioners who work on a fee basis for any business enterprises and individuals wishing to use their services. Private accountants, often referred to as industrial or management accountants, handle the financial records of particular business firms for which they work

on a salary basis. Government accountants work on the financial records of government agencies or audit the records of private business organizations and individuals whose dealings are subject to government regulation.

Accountants in any field of employment may specialize in such areas as auditing, tax work, cost accounting, budgeting and control, or systems and procedures. Public accountants are likely to specialize in auditing—that is, in reviewing financial records and reports and giving opinions as to their reliability. They may also advise clients on tax matters and other accounting problems. Most private accountants do cost or other management accounting. Sometimes they specialize in tax work or in internal auditing—that is, examining and appraising their companies' financial systems and procedures. Many accountants in the Federal Government are employed as Internal Revenue agents, investigators, and bank examiners, as well as in regular accounting positions.

### **Where Employed**

More than half of all accountants do private accounting work for the business and industrial firms where they are employed. Perhaps a third are engaged in public accounting as proprietors, partners, or employees of independent accounting firms. About 10 percent work for Federal, State, and local government agencies.

Accountants are employed wherever business, industrial, or governmental organizations are located. The majority, however, work in large metropolitan centers where there is a particularly heavy concentration of public accounting firms and central offices of large business organizations.

### **Training, Other Qualifications, and Advancement**

Training in accounting can be obtained in many kinds of institutions, including universities, junior colleges, accounting and private business schools, and correspondence schools. Graduates of all these institutions are included in the ranks of successful accountants. However, a bachelor's degree with a major in accounting or a closely related field is always an

asset; for the better positions, especially in public accounting, it may be required. Candidates with a master's degree in accounting, as well as college training in other business and liberal arts subjects, are preferred by some large public accounting firms. The Federal Government requires, for beginning accounting positions, 4 years of college training (including 24 semester hours in accounting) or an equivalent combination of education and experience. Some previous work experience can be of great value also in qualifying for private employment. A number of colleges offer students an opportunity to get such experience through internship programs which are conducted in cooperation with public accounting or business firms.

All States require that anyone practicing in the State as a "certified public accountant" hold a certificate issued by the State board of accountancy. Over half the States also restrict the title "public accountant" to those who are licensed or registered. Requirements for licensing and registration vary considerably from one State to another, and information on these requirements should be obtained directly from the board of accountancy in the State where the student plans to practice. Before the CPA certificate is issued, at least 2 years of public accounting experience, or its equivalent, is required in nearly all States. The States of New York, New Jersey, Florida, and Connecticut also require CPA candidates to be college graduates. Similar requirements are pending in several other States, but as yet the majority have no specific educational requirements for certification. All States use the CPA examination provided by the American Institute of Certified Public Accountants. In recent years, 9 out of 10 successful CPA candidates have been college graduates.

Inexperienced accountants usually begin with fairly routine work. Junior public accountants may be assigned to counting cash, verifying additions, or performing other detailed work. They usually advance to semi-senior positions in 2 or 3 years and to senior positions within another 2 or 3 years. Those successful in dealing with top executives in industry may eventually become supervisors, managers, or partners in

the larger firms. Many become independent practitioners. Beginners in private accounting may start as ledger or cost clerks, timekeepers, junior internal auditors, or, occasionally, as trainees for technical and executive positions. They may rise to chief plant accountant, chief cost accountant, senior internal auditor, or manager of internal auditing, depending on their specialty, and some become controllers, treasurers, and even corporation presidents. In the Federal Government, beginners are hired as trainees and are usually promoted in a year or so. Although advancement may be rapid for able accountants, particularly in public accounting, those with inadequate academic preparation are likely to be assigned to routine jobs and find themselves handicapped in obtaining promotion.

Accountants who want to get to the top in their profession usually find it necessary to continue their study of accountancy and related problems in their spare time—even though they may have already obtained college degrees or CPA certificates. Even experienced accountants may spend many spare hours in study and research, in order to keep abreast of legal and business developments which affect their work. Thousands of practicing accountants have enrolled in formal courses offered by universities and professional associations, in order to specialize in particular areas of accounting work or to broaden their professional skills.

### **Employment Outlook**

Employment opportunities for accountants are expected to be very good through the mid-1960's. As many as 10,000 accountants may be needed annually during this period to replace those who retire, die, or transfer to other occupations. Provided there is no major drop in the general level of business activity, nearly as many more may be needed each year to fill new positions. Demand for college-trained accountants will rise faster than demand for people without this broad background of training, because of the increasing complexity of accounting.

If the proportion of college graduates majoring in accounting remains the same as in recent years, the number receiving degrees in this

field will rise gradually—from about 11,000 in 1959 to more than 20,000 by 1970. These graduates are likely to have very good employment opportunities, at least through the middle of the decade, and graduates of private business and accounting schools should also have good job prospects during this period. The greatest number of jobs will continue to be in major industrial centers, but there will be many openings in small industrial communities.

Over the long run, accounting employment is expected to expand rapidly because of several factors: The greater use of accounting information in business management; complex and changing tax systems; the growth in size and number of business corporations which are required to provide financial reports to stockholders; and the increasing use of accounting services by small business organizations. Highly trained accountants will be in even greater demand as consultants to business managers in projects such as planning new recordkeeping systems and procedures for use with electronic data-processing equipment.

Increasing numbers of women will be engaged in professional accounting, though most public accounting firms will probably remain reluctant to employ them—because of tradition and preferences expressed by individual clients, and because some types of travel and factory assignments are considered better suited to men than to women. However, those women who rank high among college graduates with accounting majors and who secure the CPA certificate will, in time, undoubtedly break down these barriers.

### **Earnings and Working Conditions**

Starting salaries for new college graduates averaged about \$5,300 a year early in 1960, according to a private survey of 100 large business organizations actively recruiting college seniors for accounting positions. Smaller firms, especially the small CPA firms, generally pay somewhat lower rates. Salaries of senior accountants with about 5 years' experience are generally about 50 percent higher than starting salaries; salaries of those with 10 years' experience are likely to be about twice as high

as the beginning rate. Many accountants in both public and private work earn much more.

In the Federal Civil Service, the entrance salary for junior accountants and auditors was \$4,345 in 1960. Some candidates with superior academic records could qualify for a starting salary of \$5,355. Many experienced accountants in the Federal Government made between \$8,000 and \$9,000 a year, and some, with administrative responsibilities, earned \$12,000 or more a year in 1960.

Public accountants are likely to be much busier in some seasons of the year than others. They may have to work long hours and under considerable pressure during the busy period from late November to April, and at other times as well. They do most of their work in their clients' offices, and sometimes do a considerable amount of traveling in order to serve distant clients. Private and governmental accounting sometimes involves a good deal of traveling also. However, most private and governmental accountants work in the same offices day after day. Usually they work between 35 and 40 hours a week, and under the

same general conditions as their fellow office workers.

### Where To Go for More Information

Information, particularly on CPA's and on the aptitude and achievement tests now given in many high schools and colleges and by many public accounting firms, may be obtained from:

American Institute of Certified Public Accountants,  
270 Madison Ave., New York 16, N.Y.

Further information on specialized fields of accounting may be obtained from:

National Association of Accountants,  
505 Park Ave., New York 22, N.Y.

Controllers Institute of America,  
2 Park Ave., New York 16, N.Y.

The Institute of Internal Auditors,  
120 Wall St., New York 5, N.Y.

A leaflet describing accounting as a career may be obtained free from:

The American Accounting Association, School of  
Commerce,  
University of Wisconsin, Madison 6, Wis.

## Advertising Workers

(D.O.T. 0-81 and 0-06.94)

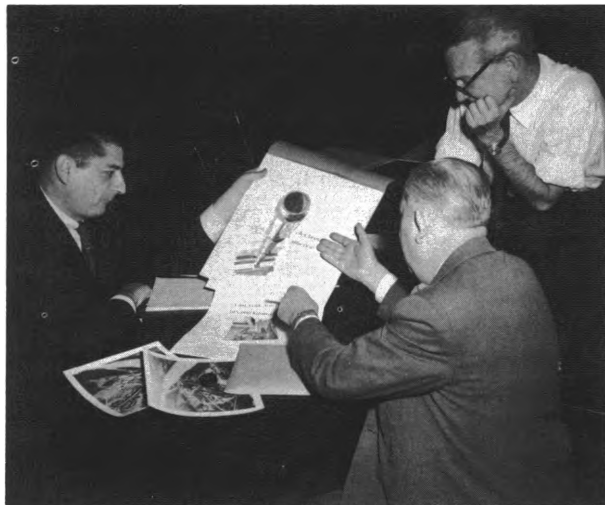
### Nature of Work

Through advertisements published in newspapers and magazines, broadcast on the radio or television, displayed on billboards, sent through the mail, or even written in smoke in the sky, businessmen can reach potential customers and persuade them to buy their products. The individuals who plan and prepare these advertisements and get them before the public are a highly specialized group of workers who help to find buyers for the tremendous amounts of goods and services produced by American industry.

Advertising workers are employed by many different kinds of organizations. Some work for big "advertisers"—the manufacturing companies, stores, and other organizations which want to sell their products and services. An even larger number are employed by "advertising agencies"—firms which prepare and

handle advertising for others on a commission or service fee basis. Still other advertising workers are on the staffs of the various "advertising media"—newspapers, magazines, radio and television stations, outdoor advertising firms, direct mail organizations, and other firms which provide a means of communicating with potential customers. Still others work for printers, engravers, art studios, product and package designers, and other firms which provide services to advertisers and advertising agencies.

About 125,000 men and women were employed in 1960 in professional positions or other jobs requiring considerable knowledge of advertising, according to an estimate by the Advertising Federation of America. This total includes executives responsible for planning and overall supervision; copywriters who write the text; artists who prepare the illustrations; layout



*Account executive and copywriter discussing advertising copy and art with a client.*

specialists who put copy and illustrations into the most attractive arrangement possible; administrative and technical workers who see to the satisfactory reproduction of the “ads”; and salesmen who sell advertising space in publications or time on radio or television programs.

In a very small advertising organization, one person may do all these things. In contrast, large organizations not only employ specialists for research, copywriting, and layout work, but sometimes have staff members who specialize in writing copy for particular kinds of products—for example, heavy industrial equipment, drugs, or foods—or for publication through such media as radio, popular magazines, or direct mail.

The specialized occupations most commonly found in advertising work are described below. Only the largest firms employ workers in each of those specialties, however; in smaller organizations, workers’ jobs may combine several of the specialties described.

*Advertising managers* head the advertising departments of manufacturing companies and other advertisers, and of newspapers and other media. In many large department stores and some large manufacturing concerns, the advertising manager is responsible not only for the planning but also for the preparation of the firm’s advertising. In such cases, he supervises copywriters, artists, and many other kinds

of workers. Most businesses, however, use the services of advertising agencies to handle all or part of their advertising programs; under these circumstances, the company’s advertising manager works mostly on policy questions—such as what general type of advertising the company should use, how large the advertising budget should be, and which agency should be employed to handle the work—and he works with the agency selected in planning and carrying through the program. He may be assisted by staff members who help him review copy and art prepared by the agency and who keep in contact with the newspapers and other firms carrying the advertising. He may also supervise the preparation of sales brochures, display cards, and other promotional materials.

The advertising manager of a newspaper, a radio station, or other advertising medium has duties similar to those of the sales manager in other kinds of businesses; he is chiefly concerned with selling the advertising time or space.

*Account executives* are employed in advertising agencies to handle relations between the agency and its clients. In starting to work with a new client, an account executive studies the client’s sales and advertising problems and discusses them with him. Then he develops an advertising program to meet the client’s needs and wishes and gets the client’s approval of the plans and of the details of proposed advertisements. Account executives must be able to sell ideas and maintain good relations with clients. They must know how to write copy and also how to use artwork, even though they usually call on copywriters and artists to carry out their ideas and suggestions.

Some advertising agencies have account supervisors who oversee the work of the account executives. In others, account executives are directly responsible to agency heads.

*Advertising copywriters* create the headlines, slogans, and text that attract buyers. They collect information about the products to be advertised and the people who might use them. They use their knowledge of psychology and writing techniques to prepare copy especially suited for readers or for listeners, depending on the particular advertising medium to be used.



They may write for television and radio audiences or for readers of newspapers, magazines, car cards, signs, and posters. Some prepare letters, booklets, and other printed materials which are sent out by direct mail advertisers to promote sales to homeowners and other prospective customers. Copywriters may specialize in copy that appeals to housewives or businessmen, or to scientists or engineers—or even in copy which deals with specific products such as lipsticks or washing machines. In advertising agencies, copywriters work closely with account executives, though they may also be under the supervision of a copy chief.

*Media directors* (or space buyers and time buyers) are employed by advertisers or in advertising agencies to determine where and when advertising should be carried in order to reach the largest group of prospective buyers at the lowest cost. They must have a vast amount of information about the cost of advertising in all kinds of media and the relative size and type of the reading or listening audience reached in various parts of the country by specific publications, broadcasting stations, and other media. The media director dealing with television and radio must also know the coverage of the various broadcasting stations, the advantages and disadvantages of different periods in the broadcasting day, and different types of programs, and related factors. Sometimes he has overall responsibility for the production of the broadcast that is to be sponsored by an advertiser, and for the “commercials.” More often, however, these responsibilities are assumed by TV and radio specialists.

*Research directors* and their assistants assemble and analyze the information needed for effective advertising programs. They study the possible uses of the product to be advertised and its advantages and disadvantages over competing products as well as its potential purchasers and the best ways of reaching them. Such workers may make special surveys of the buying habits and motives of customers or may try out sample advertisements in order to find the most convincing selling theme or most efficient media for carrying the advertising message. The research director is an important executive in advertising organizations. More

information on this occupation is contained in the statement on Marketing Research Workers. (See index for page number.)

*Production managers* and their assistants arrange to have the final copy and art work converted into printed form. They deal with the printers, engravers, and other outside firms involved in the reproduction of advertisements. The production manager must have a thorough knowledge of various printing processes and of typography, photography, paper, inks, and related technical materials and processes. He must also see to it that each of the many different steps involved in producing an advertisement is completed within a specified time schedule.

*Artists and layout men* are part of a key creative group in advertising work. They work closely with advertising managers, copywriters, and other advertising personnel in planning eye-catching advertisements. Their work is described in more detail in the statement on Commercial Artists in this Handbook and is touched upon also in the statement on Photographers. (See index for page numbers.)

### Where Employed

Perhaps a third of all advertising workers are employed in advertising agencies and more than half of these agency workers are employed in the New York City and Chicago metropolitan areas. However, there are many independent advertising agencies in other cities as well, and many of the leading agencies operate branch offices outside the major centers.

Large numbers of advertising workers employed by other types of employers—especially those employed by advertising service and media firms—are also located in the New York and Chicago metropolitan areas. However, many advertising workers are found in smaller cities throughout the country.

### Training, Other Qualifications, and Advancement

Most employers, in hiring advertising trainees, prefer college graduates with liberal arts training or majors in journalism or business administration. High grades are often con-

sidered more important than the specific type of course taken. Extracurricular college activities—particularly writing or layout work or selling experience in connection with school publications—are given weight. However, there is no such thing as a typical educational background for success in advertising. Some successful advertising people have had no college training; others started in such varied occupations as engineer, teacher, chemist, artist, or salesman.

For most advertising jobs, the essential requirement is a flair for language, both spoken and written. Since every assignment requires individual handling, a liking for problem-solving is also very important. Advertising personnel should have an unceasing interest in people and things, to help them sell their ideas to their superiors, to advertisers, and to the public. They must be able to accept criticism and to gain important points with tact.

Young people planning to enter the advertising field should get experience in copywriting or other work for their school publications and, if possible, through summer jobs in selling or in interviewing or other work connected with marketing research services. Previous experience of this kind is helpful in getting a good starting job.

Some large advertising organizations recruit outstanding college graduates and train them through programs which cover all aspects of advertising work. Most beginners, however, have to locate their own jobs by applying directly to possible employers. Young men sometimes begin as mail clerks, or as messengers and runners who pick up and deliver messages and proofs for departments and agency clients. Some start as assistants in research or production work or as space or time salesmen. A few begin as junior copywriters. Women commonly begin as stenographers and secretaries, or, if they have the required educational background, as research assistants.

Employees with initiative and drive and demonstrated talent progress from beginning jobs to creative, research, or managerial work in advertising. To qualify for management positions, they should have a well-rounded background covering all phases of the adver-

tising business including some experience with advertising agencies, media, and advertisers. This broad experience will show them the particular areas of work in which they excel and should perhaps specialize.

Exceptionally able copywriters and account executives may look forward to rapid promotion, because their work brings them directly into contact with advertisers—and these contacts can often mean the success or failure of an advertising organization. Many of these workers prefer to remain in their own specialties, however, and for them promotion can be to more responsible work at increased pay. Other topflight copywriters and account executives have set up their own agencies.

For women, one of the best avenues of entrance to advertising work is through advertising departments in retail stores. A job as clerk or runner in such a department provides the new employee with a chance to know the store's buyers and advertising personnel, and its merchandise and style of advertising. The worker may then get a chance to try her hand at copywriting and eventually to become a copywriter. Further promotion may be to copy chief and then to advertising manager or to another managerial position in the store. Experienced people frequently move from store to agency jobs, where the work is more varied and the opportunities for promotion are greater.

### Employment Outlook

Young people who are really well qualified by experience and aptitude for advertising work will find good employment opportunities in the field during the 1960 decade. Competition for advertising positions will probably be keen, however, and those who are only moderately well qualified for the work may find the advertising field a hard one to enter and an even harder one in which to advance.

The volume of advertising is expected to increase steadily during the 1960's because of the growth of industry, the development of new products and services, and the increase in competition among producers of industrial and consumer goods. Moreover, the trend toward self-service in retail stores, and the in-

creasing use of automatic vending machines are leading more and more manufacturers to advertise their products on a nationwide scale.

Thousands of new workers will be needed each year to fill the additional advertising jobs resulting from these changes. The sharpest increase in employment and the greatest number of openings are likely to occur in advertising agencies, since the present trend is for manufacturers and other advertisers to turn over more and more of their advertising work to agencies. The increase in employment of advertising workers in firms outside the agency field will probably be more moderate. As in the past, these openings in advertising will occur in many cities and towns throughout the country, but are likely to be most numerous in New York City. Even greater than the number of new job openings during the 1960 decade will be the number of openings resulting from the need to replace advertising workers whose jobs will become vacant as they transfer to other types of work, or who retire or leave for other reasons.

### Earnings and Working Conditions

Starting salaries for beginners in New York City advertising firms commonly ranged from \$60 to \$70 a week in 1960, according to limited information available. These salaries are believed typical of those paid in most large metropolitan centers. However, higher salaries were frequently paid in very large firms recruiting outstanding college graduates, and lower salaries in stores and small advertising agencies.

Salaries of workers above the trainee level were also likely to be highest in the very large firms. In advertising agencies doing a business in excess of half a million dollars annually, salaries of junior copywriters in 1959 ranged from \$3,200 to \$14,000 a year and more, according to a survey made for the trade journal, *Printer's Ink*. In these same firms, the range for senior copywriters was from \$4,500 to \$16,000 and over; and the range for account executives was from \$4,700 to \$22,000 and over. Salaries reported for copy chiefs and account supervisors were usually, but not always, sub-

stantially higher. The wide spread in salaries reflects the great difference in experience, function, talent, and degree of responsibility among workers with the same job title.

Every important advertisement represents the cooperative efforts of many different people—sales and advertising managers, marketing research specialists, product designers and technicians, printers, media representatives, and other specialists within the advertising organization itself. The advertising worker must be able to work well with all these specialists, no matter how different their point of view. Also, failure in getting along with a client or in selling a company's product can mean the loss of an important client and, sometimes, staff reductions with little advance notice.

Advertising workers frequently work under great pressure. Working hours are highly irregular, because publication deadlines must be met and last minute changes are not uncommon. People in creative jobs often work evenings and weekends to finish important assignments.

At the same time, advertising offers a satisfying and financially rewarding career to people who enjoy variety, excitement, and a constant challenge to their creative ability and who accept the attendant risks. The copywriter and the artist have the satisfaction of seeing their work in print or hearing it over the radio, even though they remain unknown to the public at large. The increased sales which result from an effective advertising job also bring satisfaction to those who have participated in the job. In spite of the hazards and the hard work, advertising "gets into the blood" of many people who have chosen a career in this field.

### Where To Go for More Information

Advertising Federation of America,  
655 Madison Ave., New York 21, N.Y.

American Association of Advertising Agencies,  
420 Lexington Ave., New York 17, N.Y.

Association of National Advertisers,  
155 East 44th St., New York 17, N.Y.

## Industrial Traffic Managers

(D.O.T. 0-97.66)

### Nature of Work

Traffic managers and their assistants arrange for transportation of raw materials, equipment, and finished products to and from industrial and business firms. It is their job to see that products bought and sold by their employers are shipped in a way that will insure prompt and safe delivery and at the same time keep costs as low as possible. After taking into consideration the kind and amount of goods to be shipped, the time when delivery is needed, and other factors, they choose the type of transportation—water, highway, rail, air, or pipeline—the route, and finally the particular carrier, or transportation company, which would be best to use for each shipment. (Traffic managers employed by railroads, airlines, trucking firms, and other transportation companies, who are chiefly concerned with attracting business to their firms, are not covered by this statement.)

The duties of industrial traffic managers and their assistants range from routine tasks, like checking freight bills, to matters involving major planning and policymaking, such as deciding whether the company should buy and operate its own fleet of trucks. Other major duties include ascertaining the freight classi-

fications and rates which apply to goods shipped, routing and tracing shipments, arranging with carriers for transportation services, preparing bills of lading and other shipping documents, and handling claims for lost or damaged goods. In addition, traffic managers are responsible for maintaining records not only of shipments but also of freight rates, commodity classifications, and applicable government regulations.

Some traffic managers are responsible for the packaging of shipments of goods and for their companies' warehouse facilities and transportation equipment. In a few companies—usually very large ones—a traffic manager may also be responsible for research activities relating to the shipping or storage of goods—for example, he may design shipping containers.

In small companies, or in firms without separate traffic departments, arrangements for transporting incoming goods may be made by the purchasing department—those for outgoing shipments, by personnel in the sales department. Employees who handle transportation arrangements in such firms must have a broad knowledge of the transportation field, but they do not usually have the title "traffic manager."

Since many aspects of transportation are subject to Federal, State, and local government regulations, traffic managers and their assistants must know about these and any other legal matters which apply to their companies' shipping operations. Some traffic managers are qualified to represent their companies before ratemaking and regulatory bodies—including the Interstate Commerce Commission, State Commissions, and local traffic bureaus—in order to request or oppose changes in rates, commodity classifications, or types of service provided by carriers.

### Where Employed

Altogether, probably fewer than 15,000 persons held jobs as industrial traffic managers in 1960. The majority were employed by manufacturing firms, although some worked for



*Traffic manager inspecting newly purchased trucks.*

stores and other types of establishments. A few traffic managers are in business for themselves, acting as consultants on transportation problems for various clients. Most traffic managers are men.

### **Training, Other Qualifications, and Advancement**

Although it is still possible for persons with a high school education to qualify for traffic manager positions on the basis of previous experience, a college education is becoming increasingly important for those who want to make a career in this field. For some kinds of work, college training may be required. For example, in order to argue cases before the U.S. Government's Interstate Commerce Commission, a traffic manager must meet certain "qualification standards" which generally include at least 2 years of college training. In selecting college graduates for trainee positions, some employers prefer to hire graduates of schools of business administration who have majored in transportation; others prefer graduates with degrees in liberal arts subjects who have had courses in transportation, management, economics, statistics, marketing, or commercial law.

The first jobs of new traffic department employees are often in shipping rooms, where they gain experience in routing shipments and preparing bills of lading and other shipping forms, or in general traffic offices, where they may do clerical work such as filing schedules of freight rates and calculating freight charges. After gaining experience in various routine tasks, employees may be advanced to more technical work such as analyzing rates and transportation statistics. After further experience, a competent worker may advance to a supervisory position, such as supervisor of rates and routes. For the most competent, promotion to assistant manager, and eventually to manager, is possible.

Workers in traffic departments may prepare themselves for advancement by participating in training programs offered by the companies where they work, by taking courses in colleges, universities, and vocational schools, or by attending seminars sponsored by various private

organizations. A mark of professional status and recognition in traffic management work is membership in the American Society of Traffic and Transportation, Inc., which can be acquired by successfully completing the Society's examinations and meeting certain experience requirements.

### **Employment Outlook**

A steady increase in employment in this small occupation can be expected during the 1960's. Some large companies will probably follow the example already set by many corporations and reorganize their shipping and receiving activities into separate traffic departments with traffic managers in charge. In other companies, the new transportation jobs will probably be located in purchasing or sales departments and thus have different job titles.

Among the factors contributing to the favorable outlook for traffic managers and their assistants are the growing emphasis in many industries on efficient management of transportation activities and the trend toward procuring raw materials and finished products from more and more remote places and distributing them to increasingly wider markets. Since transportation costs are a major factor in the price of many items, companies are becoming increasingly concerned with economies in shipping. Undoubtedly, there will be strong demand for specialists who know how to classify products so as to obtain the lowest possible freight rates, choose the carriers which are best able to handle each shipment, and otherwise protect their companies from excessive shipping expenses.

Although college training will probably be emphasized increasingly for entry jobs, experience and demonstrated ability in the fields just indicated will remain the most important factors in qualifying for promotion, especially to high-level traffic management positions.

### **Earnings and Working Conditions**

Young men with college degrees who started as business trainees in the traffic departments of large industrial firms often received annual

salaries of about \$5,000 in 1960, according to the limited data available. Many beginners with less schooling received lower salaries.

Earnings of experienced traffic managers are related generally to their companies' sales volume and transportation costs. The average (median) salary of traffic managers in companies with transportation costs totaling less than \$500,000 annually was about \$8,000 in 1959, according to a private survey. In companies where transportation costs ranged between \$4 million and \$10 million, the average was approximately \$14,000. In firms where these costs are still higher, some traffic executives earned considerably more than \$20,000.

Traffic department employees usually work the standard workweek of their companies—generally from 35 to 40 hours. Those in particularly responsible jobs may have to spend

some time outside regular working hours preparing reports, attending meetings, and traveling to hearings before State and Federal regulatory agencies.

#### Where To Go for More Information

Young people interested in careers in industrial traffic management may consult with members of local traffic and transportation associations or they may write to:

The Associated Traffic Clubs of America,  
815 Washington Bldg., Washington 5, D.C.

For information on the requirements for certification by the American Society of Traffic and Transportation, Inc., write to:

American Society of Traffic and Transportation,  
Inc.,  
22 West Madison St., Chicago 2, Ill.

## Marketing Research Workers

(D.O.T. 0-36.11)

### Nature of Work

Many management decisions about the goods companies produce, the sales campaigns they undertake, and a host of other problems connected with the marketing of products are based on the reports and recommendations of marketing research workers. Marketing research can help company officials get a better picture of what kinds of company products their customers want and where new customers can be found, thus pointing the way to bigger sales and more profitable operations.

Marketing research workers assemble the information needed by businessmen to reach decisions about such widely differing problems as selecting a new brand name, package, or design for a product; choosing a new plant location; forecasting the volume of future sales; deciding what prices to charge; making changes in the salary scales and the commissions paid to salesmen; deciding on the best means of distributing products; and choosing the kinds of advertising most likely to attract buyers. In investigating such problems, these workers may have to obtain information on people's buying



*Marketing research workers planning a survey.*

habits, consumer credit, prices charged by other firms producing competing products, transportation facilities, economic trends, population growth, technological changes, and any other factors which may be related to the specific problem they are studying.

Practically all marketing research starts with the collection of facts from published materials,

from the firm's own records, and from people especially familiar with the subject under investigation. Research workers analyzing the fluctuations in a company's sales, for example, may first study sales records in a number of different cities, in order to determine year-to-year and month-to-month changes in sales volume. They may then compare these changes with changes in population, income levels, the size of the company's sales force, and the amounts spent by the company for advertising in each city and, from these comparisons, discover the reasons for changes in the volume of sales. Other marketing research workers may study changes in the quantity of company goods on store shelves, or take inventories of products stocked in warehouses, or make door-to-door surveys to learn how many company products are already used in households.

Marketing research is often concerned with the personal opinions of the people who are using company products or who might be likely to use them in the future. For example, a survey intended to help management decide on the design and pricing of a new line of cooking utensils may involve the use of a questionnaire to obtain, from a limited number of housewives among the many who might purchase the new utensils, information about the price they would be willing to pay and their preferences in such things as the color and size of the utensil and type of handle.

A survey of this kind is usually carried on under the supervision of marketing research workers who specialize in research on consumer goods—that is, merchandise sold to the general public. In planning the survey, the marketing research worker may get help from a statistician in selecting a group (or "sample") of individuals to be interviewed, in order to be certain that the opinions obtained from them will be representative of the opinions held by all of the people who might buy the product in question. He may also seek assistance from a specialist in "motivational research"—an expert in framing questions that will produce reliable information about the motives that lead people to make the purchases they do. When the investigation gets under way, the marketing research worker may supervise a number of in-

terviewers, who call on housewives to obtain answers to the questions. He may also direct the work of the office employees who tabulate and analyze the information collected. His report summarizing the survey findings may also include other information that company officials need in order to make decisions about the new line—for example, facts about products already on the market which might compete with the product his company is proposing to introduce or facts about anticipated technological changes which might affect production methods or the salability of the product.

Marketing research surveys concerned with products used by business and industrial firms may be conducted somewhat differently from consumer goods surveys. The number of firms which might use some kinds of industrial products is relatively small and, for this reason, interviewers are sometimes able to talk to a large proportion of all potential customers, rather than a small sample as in a consumer goods survey. Also, because research on some industrial products requires interviewers with a technical knowledge of the product involved, the interviews are often conducted by the marketing research worker himself (or by several research workers, if the survey is a particularly extensive one). In the course of his interviews, the marketing research worker not only tries to get opinions about the proposed product, but keeps on the lookout for possible new ways of adapting it to industrial needs. He must, therefore, be a specialist both in marketing research and in the industrial uses of the product involved.

### **Where Employed**

An estimated 10,000 to 15,000 people were employed full time as marketing research specialists in 1960. This number included research assistants and others in junior positions who helped experienced analysts collect information and prepare reports, as well as research supervisors and directors. The majority of these workers were men; positions held by women were, for the most part, at the junior professional levels.

In addition to these marketing research workers, a limited number of other professional employees (statisticians, economists, psychologists, and sociologists) and several thousand clerical workers (clerks who coded and tabulated survey returns, typists, and others) were employed full time in this field. Thousands of other workers, many of them women, were employed on a part-time or temporary basis as survey interviewers. The great majority of the interviewers and a large proportion of the professional and clerical workers were employed on large-scale research projects dealing with consumer goods.

Among the principal employers of marketing research workers are manufacturing companies and independent advertising and marketing research organizations which do this kind of work for clients on a contract basis. Marketing research workers are also employed by very large stores, radio and television firms, and newspapers, and some work for university research centers, government agencies, and other organizations which provide information for businessmen. In size, marketing research organizations range from independently operated one-man and husband-and-wife enterprises to large firms with hundreds of employees, including dozens of professional marketing research workers, and, when needed, thousands of part-time and temporary interviewers and clerical workers. Some business firms and independent research organizations are staffed to handle all aspects of marketing research, while others handle only certain phases of the work and turn to specialized research firms for services such as interviewing; editing, coding, and tabulating questionnaires; or making store audits.

The largest number of marketing research workers are in New York City, where many major advertising and independent marketing research organizations are located and where many large manufacturers have their central offices. The second largest concentration is in Chicago. However, marketing research workers are employed in many other cities as well—wherever there are central offices of large manufacturing and sales organizations.

### **Training, Other Qualifications, and Advancement**

Many people go into marketing research after having worked in other kinds of research jobs or having been employed in work related to the field of marketing. University teachers with experience in teaching marketing research or statistics are often chosen by employers to head new marketing research departments.

A college degree is usually required of people hired as trainees in marketing research. Marketing, statistics, English composition, speech, psychology, and economics are among the courses considered most valuable as preparation for this field of work. Candidates for positions involving marketing research on industrial products are frequently required to have specialized training in engineering or other technical subjects, or else a substantial amount of sales experience and a thorough knowledge of the company's products. Graduate training may be necessary for some kinds of work—for example, motivational research or sampling and other statistical work connected with large-scale surveys. Advanced training is also an asset to the research worker who may be competing for advancement to a top-level position.

Trainees in marketing research usually start as research assistants or junior analysts. At first, they are likely to do a great deal of clerical work, such as copying information from published sources, editing and coding questionnaires, and tabulating results of questionnaires returned in surveys. They also learn how to conduct interviews and to write reports on survey findings.

After 2 to 5 years' experience, assistants and junior analysts usually advance to higher level positions, with responsibility for specific marketing research projects. With more experience, they may be promoted to supervisory positions, often with the title of project director or associate. An exceptionally able individual may eventually move on to a top position such as vice president in charge of marketing and sales.

The qualifications most important to success in marketing research work include exceptional ability in recognizing and defining problems to be solved and imagination and ingenuity in applying marketing research techniques to these



problems. Above all, this kind of work calls for the ability to analyze information and to write reports which get across to management the significance of the information collected and how it can be applied in solving the company's marketing problems.

### **Employment Outlook**

Employment in this relatively small field of work is expected to increase rapidly during the 1960's. College graduates who are well trained in marketing research methods and statistics are likely to find good job opportunities, even though only a limited number of openings can be expected to occur each year as a result of expansion and the need to replace people who retire, die, or leave the field for other reasons. Competition for top jobs is expected to be increasingly keen, however, because of the growing supply of experienced people in the field.

The demand for marketing research services is expected to increase, because there is every prospect that a constant stream of new products will be developed by American industry and competition for customers will become increasingly sharp. Business management will have a very strong incentive to make use of the best information obtainable in appraising marketing situations and planning marketing policies. Moreover, recent improvements in marketing research techniques and in statistical data have made it possible for marketing researchers to do a better job for management than ever before. As a result, company officials are likely to turn to these workers more and more for information and assistance. Existing marketing research organizations are likely to increase in size, and many new marketing research departments and new independent research firms are expected to be set up.

### **Earnings and Working Conditions**

Annual starting salaries for inexperienced college graduates entering marketing research in New York City commonly ranged from \$3,600 to \$4,800 in 1960, according to the limited data available. People with master's degrees in related fields usually started at higher salaries.

Earnings of marketing research workers rise substantially with experience. In 1957, when salaries were somewhat below present levels, men employed as junior analysts averaged about \$5,400 a year; those employed as analysts, about \$6,400; and senior analysts, over \$8,500, according to a survey by the American Marketing Association. Women in marketing research positions tend to earn less than men in comparable positions, and relatively few move up to the top jobs. According to the same 1957 survey, the average salary for women employed as junior analysts was about \$4,800 a year; for women analysts \$5,000; and for women senior analysts, \$7,200. Salaries of marketing research directors ranged from \$8,000 to more than \$30,000 a year, with an average of around \$13,000. The top salaries were paid to directors employed by very large consumer goods manufacturing companies, advertising agencies, publishing and broadcasting firms, and other types of businesses which rely heavily on the services of marketing research people.

Marketing research workers usually work in modern, centrally located offices. Some, especially those employed by independent research firms, do a considerable amount of traveling in connection with their work. They frequently work under pressure and for long hours to meet deadlines. Nevertheless, marketing research offers an opportunity for interesting and varied work to the individual who enjoys a challenging job.

### **Where To Go for More Information**

Information about specialized types of marketing research is contained in a report entitled "Selecting Marketing Research Services" which may be obtained from:

Small Business Administration,  
Washington 25, D.C.

Additional information on marketing research as a career may be obtained from:

American Marketing Association,  
27 East Monroe St., Chicago 3, Ill.

## Personnel Workers

(D.O.T. 0-39.81 through .88 and 0-68.70 through .78)

### Nature of Work

Personnel workers are responsible for helping their employers obtain good workers and assign them to work they can do effectively. One part of the personnel worker's job is to develop recruiting and hiring procedures and to interview job applicants and select the ones best qualified for the openings to be filled. Another is to keep personnel records and prepare reports based on these records. In addition, they may advise employees about their personal and job problems, deal with disciplinary cases, classify jobs, plan wage and salary scales for different positions, develop safety programs, and conduct research in personnel methods. Employee training, the administration of retirement and other employee benefit plans, and labor relations—including negotiating agreements with trade unions—are also important aspects of their work. (Personnel workers in schools and colleges who are concerned with student problems are discussed in the statement on School Counselors elsewhere in this Handbook.)

Most of the things personnel workers do involve constant contacts with employees, union representatives, job applicants, and other people in and outside the company. However, some personnel jobs—for example, setting up and analyzing personnel records—require only limited contact with people.

In business organizations with large personnel departments there are personnel workers with many different levels of responsibility. Usually, the department is headed by a top-level official who may be known as Personnel Director, or sometimes as Industrial Relations Director, Labor Relations Director, or Employee Relations Director. It is his job to formulate policy, advise other company officials on personnel matters, and administer his department. Within the department, supervisors and various personnel specialists—in labor relations, wage administration, training, safety, job classification, and other aspects of the personnel program—may be responsible for the work done by different groups of employees. Some of these

employees do technical work such as retraining employees assigned to new duties in the course of a companywide reorganization, while others assist in interviewing applicants, keep records of interviews, and do other fairly routine work.

Some business organizations limit their personnel activities largely to recruiting workers, handling disciplinary problems, and maintaining personnel records; an organization of this kind employs relatively few personnel workers. In a small business, one person often handles all activities of this kind and, in some cases, has other duties as well.

Personnel workers do much the same kind of work in Federal, State, and local government agencies as in large business firms, and the personnel departments in government agencies are organized in much the same way as in private firms. Because of special circumstances that



Photograph by U.S. Department of Labor

*Personnel worker interviewing applicant for position.*

apply to government employment, however, some kinds of personnel activities are likely to be more important in government than they are in private industry, and others less important. For example, government salary scales and hours of work are often fixed by law or regulation, and government personnel workers generally have much less occasion to discuss wage scales with trade union representatives

than do personnel workers in private industry; on the other hand, government personnel workers spend considerably more of their time in activities related to classifying jobs. Also, because many government employees are hired under merit systems, it is much more common in government than in private industry for personnel staffs to include people who devise, administer, and score the competitive examinations which are given to job applicants.

### **Where Employed**

Personnel workers are employed in nearly all kinds of business enterprises and government agencies. The total number employed in 1960 was probably between 50,000 and 60,000. Most of them work in large cities and in the highly industrialized sections of the country. The majority are men. However, many women are employed in positions of this kind in organizations where there are large numbers of workers—for example, in department stores, telephone companies, and very large companies and government agencies.

Well over half of all personnel workers are employed by private firms. The second largest number are employed by Federal, State, and local government agencies. A third and considerably smaller group of personnel workers are in business for themselves, often as management consultants or labor relations experts. In addition, a number of trained personnel workers are employed in colleges and universities as teachers of personnel administration, labor relations, and similar subjects.

### **Training, Other Qualifications, and Advancement**

A college education is becoming increasingly important for entrance into personnel work. In many companies and government agencies, new graduates are hired for junior personnel positions and then put through in-service training programs to acquaint them with their employers' operations, policies, and problems. Other companies prefer to fill their personnel positions by transferring people who already have firsthand knowledge of company operations—employees in administrative, sales, and

other types of positions. A large number of the people now in personnel work who are not college graduates entered the field in this way.

College work which provides good preparation for personnel work includes courses in personnel management, business administration, applied psychology, statistics, labor economics, political science, sociology, English, and public speaking. Some employers in private industry prefer college graduates with the specialized training provided by a major in personnel administration, while others prefer graduates with a broader background in general business administration. Still other employers consider a well-rounded liberal arts education the most desirable preparation for personnel work. Young people interested in personnel work in government are often advised to major in public administration, political science, or personnel administration; however, those with other college majors are also eligible for government employment.

For some personnel positions, educational requirements may be more specialized. Jobs involving testing or employee counseling often require a bachelor's degree with a major in psychology and sometimes a graduate degree in this field. An engineering degree may be needed for work dealing with safety standards, and a degree with a major in industrial relations may be helpful for work involving labor relations. A background in accounting or law may be useful for positions concerned with wages or pension and other employee benefit plans.

Some college graduates, when starting out in personnel work, learn what they need to know about their employer's operations and specific personnel procedures by taking part in formal training programs. Others start out as assistants to experienced personnel workers and learn on the job. From entry positions such as these, they may be advanced to higher level positions with responsibility for interviewing applicants, classifying jobs, and for other aspects of personnel work. Eventually, after they have gained experience, those with exceptional ability may perhaps be promoted to executive positions such as that of personnel director. Personnel workers sometimes advance also by transferring to

other organizations with larger personnel programs or from a middle-rank position in a big corporation to the top job in the personnel department of a smaller one.

Personal qualities regarded as important for success in personnel work include the ability to speak and write effectively and more than average skill in working with people of all levels of intelligence and experience. In addition, the prospective personnel worker should be the kind of person who can see the employee's point of view as well as the employer's, and be able to give advice which is in the best interest of both. A liking for detail, a high degree of persuasiveness, and a pleasing personality are also important in this field of work.

### Employment Outlook

A moderate number of opportunities for college graduates to enter personnel work can be expected each year through the mid-1960's. However, the competition for trainee and other entry professional positions is likely to be keen in many parts of the country. In general, employment prospects will probably be best for college graduates with specialized training in the field. Some opportunities to advance to personnel positions will be available also for young people who start out in production, clerical, or subprofessional positions and demonstrate their ability for work in the personnel field.

Employment in personnel work is expected to expand fairly rapidly over the long run—probably somewhat faster than the average increase of about 20 percent, as estimated for all occupations. As employment rises in many fields of work, companies will tend to grow in size; and with these changes there will be a need for more personnel workers to carry on recruiting, recordkeeping, and related activities. Moreover, many employers are coming to recognize the importance of the "human factor" and to depend more heavily on the services of trained personnel workers to handle their employee relations. Employment in some specialized areas of personnel work is particularly likely to rise. Wider use will probably be made of psychological tests; employee training programs are likely to be expanded and

adapted to new problems; the need for labor relations experts to handle relationships with trade unions will probably continue to increase; and the growth of employee services, safety programs, pension and other benefit plans, and personnel research is likely to continue. Thus, the expected increase in demand for trained workers should extend throughout the personnel field, although it is likely to be most rapid in some specialized areas.

### Earnings and Working Conditions

Beginning salaries averaged about \$5,000 in 1960 for men college graduates employed by large companies, according to reports from college placement directors. According to limited data from a private survey in 1959, average (median) earnings of personnel directors, industrial relations directors, and others in charge of personnel departments ranged from \$10,000 a year in comparatively small companies to \$20,000 in larger organizations. Some top personnel executives in very large corporations earned considerably more.

In the Federal Government, inexperienced graduates with bachelor's degrees started at \$4,345 a year in 1960 or, in the case of those with exceptionally good academic records, at \$5,355. The entrance salary for graduates with master's degrees was usually \$5,355 also, although a few especially well-qualified people in this group were started at \$6,435. The salaries paid many Federal Government personnel workers with administrative responsibilities and several years of experience in the field were around \$10,000 a year; some of these personnel workers, in charge of personnel for major departments of the Federal Government, earned \$15,000 or more a year.

Employees in personnel offices generally work 35 to 40 hours a week. Often, during a period of intensive recruitment, or at the time of a strike or other emergency, they may put in considerable overtime. As a rule, personnel workers are paid for holidays and vacations and share in the same retirement plans and other employee benefits as do all professional employees in the organizations where they work.

**Where To Go for More Information**

General information on personnel work as a career may be obtained by writing to:

The American Society for Personnel Administration,  
Kellogg Center, East Lansing, Mich.

Information about government careers in personnel work may be obtained from:

Public Personnel Association,  
1313 East 60th St., Chicago 37, Ill.

Information about government careers, including personnel work, may be obtained from:

American Society for Public Administration,  
6042 Kimbark Ave., Chicago 37, Ill.

**Public Relations Workers**

(D.O.T. 0-06.97)

**Nature of Work**

Public relations workers are responsible for developing and maintaining public opinion favorable to the individuals and organizations which use their services. It is their job to be informed about the attitudes and opinions of customers, employees, and other groups which are important to the interests of their employers. They are factfinders who use the results of their investigations to help their employers build a favorable public opinion.

Public relations workers often provide information about their employers' business and professional activities for publication in newspapers and magazines, for broadcasting over radio and television, and for use by other channels of communication. They plan the kind of publicity which they believe will be most effective, contact the people who may be interested in printing or broadcasting it, assemble the needed information, and write up the material. Many news items in the daily papers, human interest stories in popular magazines, and pamphlets giving information about industrial processes and job opportunities have their start at public relations workers' desks. These workers may also play an important part in arranging speaking engagements for company officials, and sometimes write speeches for them to deliver. Often they participate actively in community affairs, serving as their employers' representatives during safety campaigns and other community projects; or they may arrange plant tours for visiting businessmen, school pupils, and other groups. Showing a film at a school assembly,

staging a beauty contest, calling a press conference, and planning a convention may all be a part of a public relations worker's job.

All public relations workers tailor their programs to their employers' particular needs. Public relations work for a concert singer, for example, is likely to be directed chiefly at the concert-going public and concerned with building up the singer's reputation as an artist. In a business firm, the public relations worker is usually concerned with an altogether different set of problems—for example, with his employer's relationships with employees, civic organizations, and other community groups, as well as with such matters as promoting sales and with legislation.

Some public relations workers—for example, the press agent who handles publicity for an individual and the man who is in charge of a limited public relations program for a university, fraternal organization, or small business firm—may handle all aspects of the work. They make their own contacts with outsiders, do their own planning and research, prepare their own material for publication, and otherwise carry out the plans which have been decided on. In some business organizations, public relations workers in charge of such limited programs may be top-level officials, while in others they may occupy positions farther down the management ladder. They may combine their public relations duties with responsibility for advertising or other managerial work.

In large firms with extensive public relations programs, staffs assigned to this work some-

times number 100 or more, and several levels of managerial responsibility may be involved. Responsibility for developing plans and policies may be shared between a vice president or other top executive who is responsible for the final decisions and the director (or manager) of a public relations department. In addition to the public relations department's writers, research workers, and other professional and clerical employees, there may be specialists in different kinds of public relations work—in preparing material for publication in the daily press, for example, or in writing the financial reports sent to stockholders.

Any extensive public relations program involves both routine staff assignments and assignments which call for much skill and experience. Beginners often start out in work such as maintaining files of material about the company and its activities, scanning newspapers and magazines for appropriate articles to clip, and doing the research needed in order to assemble information for speeches and pamphlets. After gaining experience, they may be given progressively more difficult assignments, such as writing press releases, speeches, and articles for publication. The most skilled public relations work—initiating and developing plans and maintaining the outside contacts which are so important in a successful program—is usually in the hands of the director of the department and his most experienced staff members. Good ideas are so important to effective public relations work that some experts in this field spend all of their time providing ideas and planning programs but take no active part in carrying out any of these programs.

### **Where Employed**

In 1960, there were an estimated 40,000 or 50,000 public relations workers in managerial and supervisory positions and probably an equal number in nonsupervisory jobs. The number in jobs at the top (directors) was probably no more than a few thousand. Most public relations workers are men. An increasing number of women are entering and advancing

in this field, however, particularly in department stores, hospitals, hotels, and restaurants.

The majority of workers in this field are on the staffs of the organizations using their services—manufacturing firms, stores, public utilities and telephone companies, professional associations, and labor unions. Others are in consulting firms which provide counsel and other kinds of public relations services to clients on a fee basis. In 1960, there were about 2,000 public relations consulting firms, as well as a number of advertising agencies which offered public relations services; and there were about 5,000 corporations which either used the services of consulting firms or had public relations staffs of their own. The consulting firms as well as the private companies included some one-man organizations and some organizations with very large staffs.

Employment in public relations work tends to be concentrated in big cities where press services and other communications facilities are readily available and where large corporations and trade, professional, and other associations have their headquarters. More than half of the consulting firms are either in New York City or in Los Angeles, Chicago, and Washington, D.C.

### **Training, Other Qualifications, and Advancement**

A college education is generally required as preparation for this relatively new field of work. There is some difference of opinion, however, about the specific type of college training which provides the best background. College programs emphasizing courses in public relations have been in existence for only about a dozen years, and few top-ranking public relations executives have yet had an opportunity to observe how well some of this training equips graduates for work in the field. In 1960, public relations courses were being offered at an estimated 200 colleges and universities, including a few which offered a bachelor's degree with a major in public relations and a very small number which offered graduate work in this field.

Most employers agree that a broad liberal arts education provides an excellent back-

ground for public relations work. Some prefer graduates with majors in English or journalism, while others prefer candidates with a background in science or some other field related to the firm's business activities. Among the college subjects considered desirable as preparation for a career in public relations are journalism, economics and other social sciences, business administration, psychology, public speaking, literature, and physical sciences. Extracurricular activities which may provide students with some valuable experience include writing or other work connected with school publications, participation in student government activities, and part-time or summer employment in selling, public relations, or related fields of work.

In selecting new employees for work in this field, employers stress such personal qualifications as initiative and drive, the ability to express thoughts clearly and simply—both in writing and orally—and the ability to use ideas creatively. Many also prefer to hire people who have had some previous work experience. Consulting firms often stress public relations experience with another employer or experience in some related field—particularly in journalism. Other employers think that experience in other jobs with the same company or with companies in the same line of business provides a particularly good background for public relations work.

Some companies—particularly large ones which recruit and hire young men with outstanding college records as public relations trainees—have formal training programs for new employees. In other companies, new workers learn their duties by working on the job under the guidance of experienced staff members. Some companies seek to broaden the knowledge and experience of their public relations workers by arranging for them to observe different plant operations and to handle each of the various kinds of work involved in the company's public relations program.

Promotion to supervisory and managerial positions may come as the worker demonstrates ability to handle more difficult and creative assignments. Jobs at the top are limited in number, however, and competition for them is

keen. Some experienced public relations workers eventually open their own consulting firms, while others move on to better positions with other employers.

### **Employment Outlook**

This relatively new field of employment has expanded at a phenomenal rate since World War II. During the 1960's, it will probably continue to grow faster than most other fields of employment, although less rapidly than in the past. In addition to the new jobs created as expanding business firms require the services of more public relations specialists, other openings will occur because of the need to replace workers who retire or leave their positions for other reasons.

Many of the positions which will have to be filled during the coming years will call for experienced public relations workers. They are likely to be filled mainly by people who have already done research, prepared material for publication, or handled other public relations assignments. As workers with this kind of experience are moved up to fill the public relations jobs that become available, however, they will leave job vacancies farther down the line which will afford newcomers a chance to start and gain experience in the field.

### **Earnings and Working Conditions**

Young men employed as trainees in public relations work started in 1960 at salaries of \$5,000 to \$7,000 a year, according to limited data for large corporations and consulting firms. In some parts of the country and in certain types of organizations, starting salaries were somewhat lower. The highest starting salaries were paid chiefly to beginners who were employed by consulting firms in major cities and who were exceptionally well qualified from the standpoint of educational background and previous work experience.

The salaries of experienced public relations workers are generally highest in large companies, where public relations programs are likely to be more extensive than elsewhere. According to a 1959 private survey, the average

(median) salary for privately employed public relations directors or managers was about \$19,000 a year in firms with an annual sales volume of more than \$200 million and about \$12,000 in those with a sales volume of less than \$100 million. Top officials such as vice presidents in charge of public relations earned from \$25,000 to \$50,000 a year or more. Many consulting firms employ fairly large staffs of experienced public relations specialists and often pay salaries which are somewhat higher than the salaries paid in other business organizations. In social welfare agencies and universities, salary levels tend to be somewhat lower.

The standard workweek for public relations workers is usually the same as for other of-

ficials in their organizations—35 to 40 hours. Irregular hours and overtime may often be necessary, however, when public relations workers have to meet deadlines, prepare or deliver speeches, attend meetings and community functions, and make trips out of town. Sometimes, because of the nature of their regular assignments or because of disasters or special events, they may be on call on a round-the-clock basis with the workweek stretching to 6 or 7 days instead of the usual 5.

#### Where To Go for More Information

Public Relations Society of America, Inc.,  
375 Park Ave., New York 22, N.Y.

## Purchasing Agents

(D.O.T 0-91.60)

### Nature of Work

Purchasing agents and their assistants buy the raw materials, machinery, supplies, and services required by companies to carry on their businesses. Agents are responsible for obtaining needed items and services at the lowest cost consistent with good quality and for seeing that deliveries are made at the right time so that men and machines will not be idle. Many companies spend large sums of money on equipment, supplies, and services, and the people whose job it is to see that these are on hand when needed play an important role in business management.

The head of the purchasing department in a business firm or other organization is usually called a purchasing agent; sometimes, however, he may have the title of procurement or purchasing officer, director or manager of purchasing, or buyer. ("Buyer" is a title also used in retail stores for people who select and purchase merchandise for resale to individual customers. Retail store buyers are not included in this report.) In a large firm, the head of the purchasing department directs the work of a staff including assistant purchasing agents and various types of clerical workers. Purchasing assistants may be assigned to broad areas;



*Purchasing agent's assistant checking catalogs to compare prices of items.*

for example, one person may be responsible for buying raw materials; another, factory machinery; and another, office supplies. Still others may be specialists in buying certain items—for example, lumber, steel, cotton, or oil. Some companies also assign purchasing



personnel (expeditors) to the specific job of following up orders to insure delivery as scheduled.

The purchasing agent and his assistants receive order forms or requisitions from the various departments of the company. These requisitions list and describe needed items and include such information as quantities required and the date delivery is wanted. Since it is usually possible to make purchases from a number of different sources, the purchasing agent's main job is to select the seller who offers the best buy. In order to do this, the agent or his staff members must consider a number of factors, such as the exact specifications for the items required, price, quantity discounts, freight or other transportation cost, and delivery time. Much of the necessary information is obtained by comparing listings in catalogs and trade journals and telephoning various suppliers. Sometimes, suppliers are invited to bid on large orders, and the purchasing agent selects the lowest bidder who meets requirements with respect to the specifications set up for the goods and date of delivery.

Purchasing agents and assistants meet with manufacturers' salesmen to examine sample goods, watch demonstrations of equipment, and discuss items to be purchased. Sometimes, the agents visit suppliers' plants to see how products are made and to check on their quality. After placing an order, they keep in touch with the seller to insure prompt delivery. Purchasing personnel may also check on incoming shipments to see that they are of the price, quantity, and quality ordered.

It is important for purchasing agents to develop good working relations with their suppliers in order to get "rush" orders accepted, arrange for favorable terms of payment, and receive other considerations such as special packaging and prompt adjustment service. They must also work closely with personnel in various departments of their own company—for example, they frequently discuss product specifications with company engineers or problems on handling shipments with employees in the shipping and receiving, storage, or traffic departments.

### **Where Employed**

Well over half of the nearly 100,000 purchasing agents and closely related types of buyers employed in 1960 were in manufacturing industries. Large numbers of purchasing workers were also employed in government agencies—Federal, State, and local—and in wholesale and retail trade. Public utilities, transportation companies, and institutions—schools, colleges, universities, and hospitals—each employed substantial numbers of purchasing agents and assistants. Even the smallest industries employ some purchasing personnel.

Most agents work in firms in which the purchasing department includes fewer than 10 employees. In some large firms, however, the purchasing staff may include a hundred or more specialized buyers. Probably fewer than 10 percent of all purchasing agents are women. Government agencies, hospitals, restaurants, and textile firms are the principal employers of women purchasing agents.

### **Training, Other Qualifications, and Advancement**

Although employers differ greatly in the background they prefer for purchasing personnel, it is evident that a college degree is becoming increasingly important for promotion to a high-level purchasing position. Graduates of schools of business administration who have a good background in accounting and economics and some courses in purchasing are preferred by many employers. However, because of the growing complexity of factory equipment and the wide variety of new materials available, some employers seek young men who have technical knowledge as well as business training. Graduate training in business administration is required by a few employers. On the other hand, many firms select purchasing personnel from the young men of aptitude and promise who are already employed in various departments of the company. Experience with the company may outweigh educational qualifications.

Regardless of previous training and experience, new recruits in the purchasing field must spend considerable time learning about

their company's operations and purchasing procedures. Some companies provide classroom-type instruction as well as on-the-job training. The beginner may be assigned to the storekeeper's section to learn about such operations as keeping inventory records, filling out forms to initiate purchases of additional stock, or providing proper storage facilities. He may then work with an experienced buyer to learn about types of goods purchased, prices, and sources of supply. Following the initial training period, the trainee may become a junior buyer of standard catalog items. After gaining experience in the various aspects of purchasing and demonstrating ability to accept responsibility and exercise good judgment, he may be promoted to assistant buyer or assistant purchasing agent, and then to full-fledged purchasing agent. In large companies, purchasing agents or heads of purchasing departments may eventually become vice presidents with overall responsibility for purchasing, warehousing, traffic, and related functions.

### **Employment Outlook**

Opportunities are expected to be good during the 1960's for young men to enter and advance in purchasing occupations. Many new positions will arise in rapidly expanding companies. However, a greater number of job opportunities will result from the need to replace experienced personnel who will retire, die, or transfer to other jobs.

The most rapid advancement and the best jobs in purchasing work will, in most cases, go to college graduates who show exceptional judgment, a sense of responsibility, integrity, and skill in human relations. Graduates of schools of business administration who have had courses in purchasing are expected to continue to be in strong demand by employers. Demand is expected to be above average for graduates with a good background in engineering and science to fill jobs in purchasing departments of firms manufacturing complex machinery, chemicals, and other products of a technical nature. Graduates with degrees from liberal arts colleges will also continue to obtain trainee positions in many types of firms. Al-

though outstanding persons without a college education will continue to be promoted from clerical, sales, and other types of jobs, their opportunities for advancement to high-level purchasing jobs will tend to decrease.

Over the long run, a continued increase in the demand for purchasing agents and their assistants may be expected. Among the major factors underlying this generally favorable outlook are the continuing increase in the size of business and manufacturing firms, the emergence of new products, new sources of supply (including foreign markets), and the ever increasing complexity and specialization of business functions. Competition among manufacturers for new, improved, and less costly raw materials, goods, and services will further direct the attention of top management to the importance of the purchasing function. Furthermore, large companies are expected to expand purchasing-related activities such as inventory control—including the use of electronic data-processing equipment—and the development of scientific methods for materials management.

### **Earnings and Working Conditions**

Beginning annual salaries for men college graduates hired as trainees in purchasing departments of large firms averaged about \$5,000 in early 1960.

A private survey indicated that average (median) annual salaries earned by experienced purchasing agents in 1959 ranged from \$8,400 in firms with an annual volume of purchases under \$3 million to \$15,300 in firms with purchases amounting to more than \$30 million. Salaries of \$25,000 or more are earned by some top purchasing executives.

Employees in purchasing departments usually work the standard workweek of the company—generally from 35 to 40 hours a week. Purchasing agents may prepare reports, attend meetings, visit suppliers' plants, or travel outside regular working hours. Employees in purchasing departments usually receive the same holidays, vacations, and various benefits as other workers in the company.

A few companies pay tuition and other fees for purchasing department personnel who enroll in specialized educational courses and training programs. Purchasing agents and buyers who must travel in connection with their jobs are usually reimbursed for lodging, transportation, and other costs.

**Where To Go for More Information**

Young people interested in a career in purchasing may consult with members of local purchasing associations, or they may write to:

National Association of Purchasing Agents,  
11 Park Pl., New York 7, N.Y.

# THE PERFORMING ARTS

Every day, millions of people get recreation and pleasure from listening to music on the radio, on records, and at concerts and from watching stage and television plays, movies, and ballet performances. For many, singing or playing an instrument is a rewarding avocation and so, for smaller numbers, is acting or ballet dancing. These performing arts are also professional careers for thousands of highly trained artists, who aim to make a living from their performances.

The interest in and attraction of careers in the arts is so great that the number of first-rate artists seeking employment is generally much larger than the number of full-time employment opportunities available. Many performers therefore supplement their incomes by teaching, and thousands of others have to work much of the time in other occupations.

The difficulty of earning a living as a performer is one of the facts young people should bear in mind in considering an artistic career. They need to know also that most aspiring young artists have to spend many years in intensive training and practice before they are ready for public performances. It is important for them to consider the possible advantages of making their art a hobby rather

than a field of work. For a career in any of the performing arts, a person needs not only great natural talent but also determination, a willingness to work long and hard, and an overwhelming interest in his chosen field—a love for it so great that, despite all obstacles, he would rather work in it than in any other occupation.

The following statements give detailed information on the instrumental musician, singer, actor, and dancer as a performing artist and in other work. Many men and women with an interest and talent in music are also employed as directors of church choirs or school choruses or as orchestra or band conductors. A few with great creative talent work chiefly as composers of music. Other musicians arrange or adapt melodies for orchestras or bands; still others (copyists) copy parts for individual instruments from the musical scores written by arrangers. Similarly, a few people with ballet training and originality work as choreographers, who design new ballets or other types of dance performances, and some are dance directors. Another small field of employment, to which people with executive ability and a knowledge of acting and of production problems can sometimes progress, is directing or producing stage, television, or motion picture productions.

## Musicians and Music Teachers

(D.O.T. 0-24.12 and 0-24.31)

### Nature of Work

Professional musicians—whether they play the piano, violin, or trumpet in a symphony orchestra, dance band, or “jazz combo”—have behind them many years of study and intensive practice. Although most musicians play only one instrument, many are qualified to play two or more—for example, the saxophone and clarinet, oboe and English horn, or piano and violin. As a general rule, musicians also specialize in either classical or popular music; only a few play both types professionally.

In a symphony orchestra, 85 to 100 or more musicians play together under the direction of the conductor. More than half the musicians in the orchestra play the strings—violins, violas, cellos, and double basses. Smaller numbers play the brass—trombones, trumpets, French horns, and tubas; and the wood winds—oboes, flutes, piccolos, clarinets, English horns, and bassoons; and a few play the drums, cymbals, and other percussion instruments. As a rule, the orchestra has among its members a pianist, who plays with it when needed. Each orchestra player has attained great technical skill in



*Dance bands usually include piano, string bass, drum, trumpet, and saxophone.*

playing his particular instrument, and they play together with great precision. The musicians in the “first chairs”—the leading players of each kind of instrument—are especially fine artists and can play any solos called for by the parts for their instruments.

Musicians trained in classical music also play in opera and theater orchestras and other kinds of performances needing orchestral accompaniments. Some form small groups—a string quartet or a trio (made up of a violinist, a cellist, and a pianist, for example)—which give concerts of chamber music. Many pianists serve as accompanists for vocal or instrumental soloists or choral groups or provide background music in restaurants or other places. Most organists play in churches, usually directing the choir as well as playing the organ. A very few exceptionally brilliant and well-known musicians—chiefly pianists and violinists—become concert artists, giving concerts of their own and with symphony orchestras. Orchestras, chamber music groups, and individual artists often make recordings.

Musicians who specialize in popular music usually play the trumpet, trombone, or saxophone, or one of the “rhythm” instruments—the piano, string bass, drums, or guitar. Dance bands made up of these instruments play in night clubs, restaurants, and at special parties. The best known bands and solo performers sometimes give concerts and perform on television. They also make recordings.

Besides working as performers, many musicians give lessons. A large number of pianists,

as well as some other musicians, are chiefly teachers and do little if any paid work as performers. For others, teaching is a secondary activity. Sometimes musicians instruct pupils privately in their own studios or in the pupils’ homes; others become members or join the faculty of music schools or conservatories or of colleges which offer instruction in instrumental music. In addition, many people with training in piano, or sometimes another instrument, become music teachers in elementary or secondary schools. These teachers direct vocal and instrumental music programs in the schools, teach music appreciation, and may also give group instruction on an instrument.

In addition to the people primarily employed as musicians or music teachers, thousands of qualified instrumentalists have other full-time jobs and only occasionally do paid work in the field of music. Most of these part-time musicians belong to dance bands which are hired to play at private parties or for other special occasions. Some with a background in classical music play occasionally in an orchestra or for other performances, or do some part-time teaching.

### Where Employed

The number of people chiefly employed as instrumental musicians was probably somewhat less than 100,000 in mid-1960. About half were teaching in the Nation’s schools and colleges. Most of the remainder were either private music teachers or primarily performers. A few musicians were employed in hospitals, to work in the field of music therapy, and some worked in music libraries and other places.

Most professional musicians work in large cities, principally in New York, Chicago, and Los Angeles, where most of the Nation’s entertainment activities are concentrated. In addition, sizable numbers work in other cities—such as Boston, Philadelphia, Rochester, and Baltimore—which have major symphony orchestras or music schools and conservatories. Music teachers in elementary and secondary schools, as well as in colleges and universities, are employed all over the country. Moreover, just about every town and city has at least one

private music teacher, usually a pianist. Dance bands are also located in many communities, although in the smaller towns, their members are usually only part-time musicians with other regular jobs.

### **Training and Other Qualifications**

Most people who become professional musicians begin studying an instrument at an early age. Boys and girls often get their first introduction to instrumental music through group instruction in piano, violin, trombone, and other instruments offered in many elementary schools and high schools. They can also take music lessons from private teachers or in the preparatory department of a music conservatory.

To achieve a career as a performer of classical music or in teaching instrumental music, young people need intensive training—either through private study with an accomplished artist, or in a college or university with a strong music program, or in a conservatory of music. They need to acquire not only great technical skill but also a profound knowledge of music and how to interpret it. Before a young person can qualify for advanced study in a music conservatory, it is frequently necessary to have an audition. Many of the teachers in these schools are accomplished artists who will undertake the training only of promising young musicians. An audition is sometimes required also for admission to the department or school of music of a college or university. However, the emphasis on talent as a performer is less in the case of young people preparing for music teaching than for those preparing only for careers as performers.

Many conservatories of music and college and university schools of music offer 4-year programs leading to a bachelor's degree in music education. Students who complete these programs can qualify for the State certificate required for public school positions. Conservatories and collegiate music schools frequently award also the degree of bachelor of music to students who major in instrumental or vocal music. The 4-year program leading to this degree provides not only training as a performer but also a broad background in musical history

and theory, together with some liberal arts courses. Advanced degrees are usually required for college teaching positions, but exceptions may be made for especially well-qualified artists.

Musicians who play jazz and other popular music also must be skilled in their instrument and have an understanding of and feeling for that style of music. As a rule, when young, they take lessons with private teachers and then seize all opportunities, beginning while they are still in high school, to play in amateur or paid performances. Some groups of young people form their own small dance bands. As they gain experience and become known, the players may have opportunities to audition for other local bands and, still later, for the better known bands and orchestras.

### **Employment Outlook**

As a field of employment, instrumental music has been overcrowded for many years, and it is expected to remain so during the 1960's. Opportunities for concerts and recitals are not numerous enough to provide adequate employment for all the pianists, violinists, and other instrumentalists qualified as concert artists. Competition is usually keen for positions which afford some stability of employment—for example, jobs with major orchestras and teaching positions in conservatories and colleges and universities. Because of the ease with which a musician can enter private music teaching, the number of music teachers has been and will probably continue to be more than sufficient to give instruction to all the young people seeking lessons. Though many opportunities for single and short-term engagements playing popular music in night clubs, theaters, and other places can be expected, the supply of qualified musicians seeking such jobs is likely to remain greater than the demand. On the other hand, a shortage of well-qualified church organists and choir masters may persist in many communities during the next few years; first-class, experienced accompanists are likely to remain relatively scarce; and public school systems will probably continue to need more, fully qualified music teachers and supervisors.

Employment opportunities for performers are not expected to increase over the long run.

Although the number of civic orchestras in smaller communities has been growing steadily, many of these orchestras provide only part-time employment for musicians who work chiefly as teachers or in other occupations. Moreover, the openings created by the establishment of these orchestras have been more than offset by the decline in opportunities in the theater and other places, which has resulted, in part, from the greatly increased use of recorded music.

The employment outlook in music education, for people who are well-qualified as both musicians and as teachers, is the bright spot in the picture. A great increase in the numbers of young people of high school and college age will take place during the 1960's. Moreover, the number of public schools with music programs is growing steadily, and interest in music as an avocation is also rising, as evidenced by the increasing sales of musical instruments. Thus over the long run, a fairly rapid increase can be expected in the employment of public school music teachers and also in the teaching staffs of college and university music schools and conservatories of music.

### Earnings and Working Conditions

Musicians who were members of symphony orchestras earned from \$90 to \$350 a week in 1960, and those who played in dance bands were paid from \$60 to \$300 per week, according to a private survey. Symphony orchestras had relatively short seasons, generally ranging from 22 to 32 weeks a year. Instrumentalists who were members of small ensembles reportedly received as much as \$200 per concert. Concert soloists have the highest earnings of all musicians, but they have to deduct the costs of expensive clothes, travel, and management and coaching fees from their earnings. The amount they receive for a performance depends to a large extent on their professional reputations.

The salaries of public school music teachers are determined by the salary schedule adopted for all teachers. (See statements on Elementary and Secondary School Teachers.) However, they frequently supplement their earnings by giving private music lessons and taking church positions. Earnings from private teaching are

very uncertain and vary according to the musician's reputation, the number of teachers in the locality, the number of students desiring lessons, the economic status of the community, and other factors.

Musicians who are performers customarily work at night and on weekends. They must also spend considerable time in regular daily practice and in rehearsing new scores. Most private teaching is done in the late afternoon, on Saturdays, and sometimes in the evening.

Performers may have relatively long periods of unemployment between jobs and, thus, the overall level of their earnings is generally lower than it is in many other occupations. Moreover, performers do not usually work steadily for one employer. Consequently, few performers can qualify for unemployment compensation, and they seldom have paid sick leave or paid vacations.

Most musicians who play professionally belong to the American Federation of Musicians (AFL-CIO). Concert soloists also belong to the American Guild of Musical Artists (AFL-CIO).

### Where To Go for More Information

Information about wages, hours of work, and working conditions for performers is available from:

American Federation of Musicians (AFL-CIO),  
425 Park Ave., New York 22, N.Y.

Information about employment opportunities for church musicians, as well as the requirements for certification of organists and choir masters, may be secured from:

American Guild of Organists,  
630 Fifth Ave., New York 20, N.Y.

A list of accredited schools of music is available from:

National Association of Schools of Music,  
Knox College, Galesburg, Ill.

Further information about employment opportunities for elementary and secondary school music teachers is available from:

Music Educators National Conference, The National Education Association of the United States,  
1201 16th St. NW., Washington 6, D.C.

## Singers and Singing Teachers

(D.O.T. 0-24.00 through 0-24.05)

### Nature of Work

Professional singing is an art which requires not only a fine voice, but also a highly developed technique and a broad knowledge of music. The pinnacle of a singing career is to become an opera and concert star. The tiny group of famous artists who have reached this height sing leading roles with the major opera companies, go on concert tours in the United States and other countries, and often make recordings. Somewhat larger numbers of singers obtain secondary roles in operas and engagements as soloists in oratorios and other types of performances. A much larger group—probably the majority of all professional singers of classical music—are soloists in churches or synagogues. Some singers also become members of opera and musical comedy choruses or other choral groups.

Singers who specialize in popular music have a style of singing so different from that of singers of classical music that there is little in common technically between the two groups. Although most popular music singers have some vocal training, many rely on their personalities to help them “put a song across” to a much greater extent than do singers of classical music. These singers perform in musical shows of all kinds—in the movies, on the stage, on radio and television, and in night clubs and other entertainment places. They may be employed as featured singers with a dance band; some also sing with other vocalists in small groups such as trios or quartets. The best known popular music singers make many recordings.

Since most singers of both classical and popular music have only part-time or irregular employment as singers, they often have to work at other jobs between engagements. Some—chiefly singers of serious music—give private voice lessons. A sizable number with the necessary qualifications are employed in elementary and secondary schools, where they teach music appreciation courses and lead choruses. Others give voice training in college and university

schools or departments of music or in music conservatories. A large number have full-time jobs of other types and sing only part time, in the evening or on weekends.

### Where Employed

Probably fewer than 75,000 people were earning the major part of their incomes from singing engagements or vocal teaching in mid-1960. Opportunities for singing engagements are mainly in New York City, Los Angeles, and Chicago—the Nation’s chief entertainment centers. Nashville, Tenn., is a major place of employment for folk singers and country music singers, for both “live” performances and recordings. Persons trained as singers who teach music in elementary and secondary schools and in colleges, universities, and conservatories of music are employed throughout the country. Opportunities for part-time employment, chiefly as church singers, are to be found in small towns as well as in big cities.

### Training and Other Qualifications

Young people who want to perform professionally as singers of serious, or classical, music should acquire a broad background in music, including its theory and history. Ability



*Singers who perform on stage sometimes are required to dance.*



to play the piano is also very helpful; so boys and girls interested in a career in this profession should start piano lessons at an early age. As a rule, voice training should not begin until after the individual has matured physically, although young boys who sing in church choirs receive some training before their voices change. Moreover, because of the work and expense involved in serious voice training—which often continues for years after the singer's professional career has started—it is important that a prospective singer audition before a competent voice teacher to determine whether professional training is warranted.

Young people can prepare for careers as singers of classical music by enrolling in a music conservatory, a school or department of music connected with a college or university, or by taking private voice lessons. Before students are admitted to music conservatories or collegiate schools or departments of music, they may have to audition before a faculty member who may be a well-known artist. In addition to voice training, these schools provide young people with the background needed for an understanding of music and its interpretation, a knowledge of foreign languages, and sometimes dramatic training. After completing a 4-year course of study, a graduate may be awarded either the degree of Bachelor of Music, or Bachelor of Science (in music), or Bachelor of Fine Arts.

Young singers who plan to teach music in public elementary or secondary schools need at least a bachelor's degree with a major in music education and must meet their State certification requirements for teachers. Such training is available in over 500 colleges and universities throughout the country. College teachers are usually required to have a master's degree and sometimes a doctor's degree, but exceptions may be made for especially well-qualified artists.

Singers of popular songs usually have some voice training, but not as much as singers of classical music. The typical popular song does not demand that the voice be developed to cover as wide a range on the musical scale as is required for classical music, and the lack of a powerful voice may be overcome by using a

microphone. Although voice training is an asset for singers of popular music, many with untrained voices have had successful careers.

There are some opportunities for young singers of popular songs to become known in their communities by participating in amateur and paid performances while still in high school. These engagements may lead to employment with local dance bands, and possibly later with well-known ones.

Young people wishing to become either classical or popular singers need to realize that, in addition to musical ability, it often takes an outstanding personality, an attractive appearance, good contacts, and just plain good luck to achieve a singing career. Furthermore, a career in this art is often relatively short, since it depends on a good voice and public acceptance of the artist, both of which may be affected by age.

#### **Employment Outlook**

The employment situation for singers of either classical and popular music will probably remain highly competitive during the 1960's. As in past years, competition will be especially keen among popular singers. A great number of single job openings are likely to occur in the entertainment field—the opera and concert stage, the movies, the theater, night clubs, radio and television, dance bands, and other places—but not enough to provide all qualified singers with steady work. The great majority of professional singers, therefore, will probably have to supplement their incomes by working part time as singing teachers or in other jobs. The demand for church singers is expected to expand because of the continued growth in the size and number of religious congregations, but most of these openings will probably be filled either by part-time singers who have steady employment in other fields or by volunteers.

Little growth in overall employment opportunities for performers is likely over the long run. The use of recorded music has practically replaced the "live" singer on radio; also, the number of television performances given by singers is, and will probably continue to be, limited. On the other hand, the outlook for

singers who can meet State certification requirements for positions as music teachers or who can qualify for college teaching will be considerably brighter than for performers. The demand for music teachers in the Nation's public elementary and secondary schools is expected to grow along with school enrollments. Some increased employment of music teachers also can be expected in colleges and universities, since enrollments in schools and departments of music in these institutions are likely to rise along with the increase expected in college enrollments generally. In addition, music teachers will be needed to replace those who will transfer to other fields of work, retire, or die.

### **Earnings and Working Conditions**

Most professional singers have relatively modest earnings. For example, soloists with church choirs received around \$25 per service, or its equivalent each month, in mid-1960, according to the limited information available. Singers employed by dance bands and in motion pictures earned as much as \$200 per week. In contrast, the relatively few well-known singers in the field earn considerably more than these amounts. A concert soloist, opera star, or a top recording artist of popular music may command more than \$1,000 for a single performance.

The salaries of public school music teachers were determined by the salary schedule adopted for all teachers in their school system. Private music teachers charged from \$1 to \$25 per lesson, depending on the teacher's reputation, and location, size of community, and other factors.

Singers generally work at night and on weekends. School teachers have regular working hours, and private voice teachers can usually arrange to give lessons at their own convenience. Work in the entertainment field is seasonal, and few performers have steady jobs.

Singers who perform professionally on the concert stage or in opera belong to the American Guild of Musical Artists, Inc.; those who sing on radio or television or who make phonograph recordings are members of the American Federation of Television and Radio Artists; singers in the variety and night club field belong to the American Guild of Variety Artists; and those who sing in the movies belong to the Screen Actors Guild, Inc. All of these unions are branches of the Associated Actors and Artistes of America (AFL-CIO).

### **Where To Go for More Information**

Information about wages, hours of work, and working conditions for performers is available from the unions which organize singers in the various entertainment media.

Information about accredited schools and departments of music may be obtained from:

National Association of Schools of Music,  
Knox College, Galesburg, Ill.

Further information about employment opportunities for elementary and secondary school music teachers is available from:

Music Educators National Conference, The National Education Association of the United States,  
1201 16th St. NW., Washington 6, D.C.

## **Actors and Actresses**

(D.O.T. 0-02.11.15 and .41)

### **Nature of Work**

Making a character come to life before an audience is a job which has great glamour and fascination for many people. It is also hard and demanding work, requiring special talent and involving many difficulties and uncertainties.

Only a very few of the close to 20,000 actors and actresses in the United States have achieved recognition as stars—on the stage, in motion pictures, or in television or radio. A somewhat larger number are well-known, experienced performers, frequently hired for supporting roles. The great majority, however, are struggling for

a toehold in the profession, glad to pick up small parts whenever and wherever they can.

New actors generally start out in "bit" parts, where they have only a few lines to speak. If successful, they may then have a chance to progress to larger supporting roles, of which there are several in most plays. The actors who have minor parts in stage productions may also serve as understudies for the principals. If a leading player has to be absent from a performance, the understudy gets a chance to demonstrate his acting ability and attract attention to his qualifications for important roles.

When a play is being prepared for production, the cast has to spend many hours in rehearsal. Actors who prepare for roles either on the stage or in the movies must memorize their lines and the cues—the last words spoken by another actor which are the signal to come on stage, make an exit, or begin speaking. Radio actors typically read their parts. They have to be especially skilled in expressing character and emotion through the voice, since this is their sole means of creating an impersonation for their audience.

Besides the actors with speaking parts, "extras" who have no lines to deliver are used in almost every motion picture. In spectacular productions, the number of extras who take part in crowd scenes is often very large. Altogether, about 3,000 people were listed as movie extras in Hollywood in 1959, although the number employed at any given time is generally much smaller than this.

Some actors find jobs as dramatic coaches or become directors of stage, television, radio, or motion picture productions. A few are engaged in teaching in schools of acting or in the drama departments of colleges and universities.

### Where Employed

The legitimate stage and motion pictures are probably the largest fields of employment for actors, although television and radio also employ many actors intermittently.

In the winter, most employment opportunities on the stage are in New York. In the summer months, however, stock companies in



*Actors and actresses often rehearse many hours before the curtain goes up.*

suburban and resort areas are an equally large field of employment. There are also a small but growing number of winter stock companies in southern resort areas. In addition, many cities now have community or "little" theaters, which provide opportunities for local talent as well as for actors and actresses brought in from New York and other centers. Plays that go "on the road," moving from city to city, are normally produced in New York, and the casts are therefore selected from actors located there.

Although employment opportunities in motion pictures are centered in Hollywood, a few studios are on Long Island, N.Y., and some in other parts of the country. In television and radio, most opportunities for actors are at the headquarters of the main networks—in New York, Los Angeles, and, to a lesser extent, Chicago. In addition, some local television and radio stations occasionally employ actors.

### Training and Other Qualifications

Since an actor learns largely through practice, young people aspiring to acting careers should get as much amateur acting experience as possible. They obtain this experience by taking part in high school and college plays or working with little theatre and other acting groups in their home towns.

Formal training in acting may also be helpful. Such training can be obtained at special

schools of the dramatic arts, chiefly in New York, or at the High School of Performing Arts which is part of that city's school system. The dramatic arts are also taught in over 400 colleges and universities. A college degree is not necessary for an acting career, but has value in giving the actor an appreciation of the great plays, old and new, and a greater understanding of the roles he may be called on to play. College drama curriculums usually include courses in liberal arts subjects, speech, pantomime, play production, and the history of the drama, as well as practical courses in acting. Graduate degrees in the fine arts or in drama are necessary for college teaching positions.

Outstanding talent for acting and great interest and determination are essential for success in the theatre. Ability to memorize, a good speaking voice, good health, and the physical stamina to work long hours are necessary. Ability to sing and dance is an asset, and is becoming increasingly important for a career in acting.

Many actors who are successful in local dramatic productions eventually try for a chance to appear on the New York stage. To accomplish this, an actor registers with one of the theatrical agents in New York listed by the Actors' Equity Association, AFL-CIO. When the agent judges that an actor is promising, the agent may arrange for auditions with producers; the auditions may lead to acting contracts.

In all media, whether the legitimate stage, motion pictures, radio, or television, the best way to start is to make use of the local opportunities and to build on the basis of such experience. Inexperienced actors usually find it extremely difficult to obtain employment in New York or Hollywood. Although motion picture producers do give some screen tests to inexperienced applicants, only an infinitesimal proportion of the many thousands of people taking these tests succeed in entering the movies in this way. The motion picture field is an especially difficult one to enter, and employment is often a result of previous successful experience on the Broadway stage.

To become a movie extra, one must get on the list maintained by Central Casting, a no-fee

agency which works with the Screen Extras Guild and supplies all extras to the major movie studios in Hollywood. Applicants are accepted only when the number of people of a particular type on the list—for example, athletic young men, old ladies, or small children—is below the foreseeable need. In recent years, only a very small proportion of the total number of applicants have succeeded in getting on the list. Extras have very little, if any, opportunity to advance to speaking roles in the movies.

The length of an actor's working life depends largely on his skill and versatility. Great actors and actresses can go on almost indefinitely. Supporting players also may have opportunities to portray the kinds of roles in which age is not a disadvantage. On the other hand, for many members of the profession, employment opportunities become increasingly limited during and past middle age. This is especially true of those who become typed in romantic, youthful roles.

### Employment Outlook

The acting field has been overcrowded for many years. In the legitimate theater and also in motion pictures and radio and television, job applicants outnumber the jobs available many times. Most actors have employment in their profession for only a small part of the year.

With the development first of motion pictures, then of radio, then of TV, employment opportunities for actors in the theater have been more and more reduced. The recent growth of summer stock companies has somewhat increased the employment of actors in the summer months, but the numbers of New York stage productions, of motion pictures, and of radio shows requiring actors have been declining.

Although a motion picture production may use a very large number of actors, they are employed only while the picture is being filmed, and the films are widely distributed and may be used for years. Radio uses few actors. The number of TV dramas and commercials using actors is increasing, but not nearly enough to offset the decline in the other media. Moreover, television stations often broadcast "taped" dramas rather than live productions, and, like

motion picture films, these tapes may be widely distributed and used for a long time. Taped TV plays give employment to actors for only one performance, whereas live dramas give employment whenever broadcast.

One possibility for future growth in the legitimate theater lies in the establishment of year-round professional acting companies in more cities. The number of communities with such acting groups is growing. Further increases are likely also in the employment of actors on television. In the acting field as a whole, however, employment opportunities are not expected to increase, and may well decrease somewhat, over the next decade. The number of new entrants to the profession will continue to be greater than the number of employment opportunities that may generally become available. Even highly talented young people are likely to face great competition and economic difficulties in the profession.

#### **Earnings and Working Conditions**

Actors and actresses employed in the legitimate theater belong to the Actors' Equity Association. If employed in the movies or on TV or radio, they belong to the Screen Actors Guild, the Screen Extras Guild, or the American Federation of Television and Radio Artists. These unions and the show producers sign basic collective bargaining agreements which set minimum salaries, hours of work, and other conditions of employment. In addition, each actor signs an individual contract which may provide for higher salaries than those specified in the basic agreement.

The minimum weekly salary for actors in large New York theaters was \$111 in 1960. Those appearing in small "off-Broadway" theaters had considerably lower rates. For shows on the road, the minimum rate was \$145 a week. For rehearsal time, it was \$82.50 a week in Broadway shows and much lower in small "off-Broadway" theaters.

Motion picture actors and actresses had a minimum daily rate of about \$100 in mid-1960. For extras, the minimum rate was about \$24 a day. Actors on network television received a minimum of \$155 for a single half-hour pro-

gram, and 10 hours of rehearsal time; actors on radio received \$49.60 for a half-hour performance, 1 rehearsal hour included. Those with contracts for longer programs or a series of programs had relatively lower rates.

In all fields, many well-known actors and actresses have salary rates above the minimums. The salaries of the few top stars are many times the figures cited. On the other hand, because of the frequent periods of unemployment characteristic of this profession, annual earnings are low for all but a very few of the best known performers. According to union estimates, the earnings of actors from work in the legitimate theater averaged well under \$2,000 in 1959. The majority of those employed primarily in radio and television made slightly more—probably around \$2,500, on the average. Screen extras averaged about \$1,400 in 1958.

Eight performances amount to a week's work on the legitimate stage and any additional performances are paid for as overtime. The basic workweek after the opening of a show is 36 hours, including time for rehearsals. Prior to the opening, however, the workweek is usually longer to allow enough time for rehearsals. Evening work is, of course, a regular part of a stage actor's life. Rehearsals may extend over weekends and holidays as well as late at night. Traveling over the weekend is often necessary when plays are on the road.

Some actors are covered by a pension fund and a growing number have hospitalization insurance to which their employers contribute, but very few have paid vacations or sick leave. Most actors get little if any unemployment compensation, since they seldom have enough employment to meet the eligibility requirements. Consequently, when a show closes, they often have to take any kind of casual work obtainable while they are waiting for another role.

#### **Where To Go for More Information**

Actors' Equity Association,  
226 West 47th St., New York 36, N.Y.

American Federation of Television and Radio  
Artists,  
15 West 44th St., New York 36, N.Y.

## Dancers

(D.O.T. 0-45)

### Nature of Work

Dancing is an ancient and worldwide art, having many different forms. Its aim may be to express emotions—joy, anger, grief, worship—to tell a story, or to achieve beautiful and exciting patterns of movement.

Dancers in this country may perform in classical ballet or modern dance, in dance adaptations for musical shows, in folk dances, or in tap and other popular kinds of dancing. In the classical ballet, movements are based on certain conventional or stylized “positions,” and women dance “en pointe” (on the very tips of their toes). The effect sought is one of effortless grace. In modern dance, movements are much more varied but are nonetheless carefully planned and executed to follow a pattern.

In all types of dance productions, most of the performers dance together as a chorus. A smaller group of selected dancers may do special numbers, and a very few do solo work. The number of ballerinas and other top artists is, of course, much smaller still.

Many dancers combine teaching with their stage work or teach full time in schools of the ballet or in colleges and universities. A few dancers have become choreographers, who create new ballets or dance routines. Others work as dance directors and train the dancers in new productions.

This statement does not include instructors of ballroom and other social dancing.

### Where Employed

In mid-1960, there were about 15,000 dancers and dancing teachers in the United States. More than half of this number were teaching in private schools of the dance and in schools and colleges. The remainder were primarily performers on the stage, screen, and television. A few trained in dance therapy were employed by hospitals to work in this new field used in the treatment of mental disorders.

Dancing teachers are located chiefly in large cities, but almost every town and city has its school of the dance. The great majority of performing dancers are in New York City, Los Angeles, Las Vegas, and Chicago.

### Training and Other Qualifications

Most girls and boys who expect to become professional dancers have had this ambition since they were young children. The traditional way of preparing for a dancing career is to begin serious training in a professional school by age 12 or earlier. The age at which girls should learn toe dancing depends on the individual child. In any case, 2 or 3 years of prior preparation is needed before the young girl should start dancing “en pointe.” Professional ballet training typically involves from 10 to 12 lessons per week for 11 or 12 months in the year, plus many additional hours of practice. The length of the training period depends on the student’s ability and physical development, but many dancers begin their professional employment at age 15 or 16.

The selection of the professional dancing school is important for two reasons. First, the school must use expert judgment in setting the pace of training since permanent damage can be done to the legs and feet by too early and too severe exercise. Second, the school’s connections with producers may be helpful in obtaining employment on the stage, screen, and television.

Because of the strenuous program of training in the professional schools, the general education received by students in these schools is not likely to exceed the legal minimum. However, really great performing artists have to be more than technicians. Many people competent to judge therefore believe that a dancer’s education should include such subjects as music, literature, and history to aid them in their interpretations of dramatic episodes and of music. The High School of the Performing Arts in New York City combines technical dance training with preparation for college, for students

who can meet the academic standards and have shown talent in one of the performing arts. In addition, approximately 70 colleges and universities confer bachelor's degrees on students who have majored in physical education and have concentrated on the dance, and some give graduate degrees, the M.A. and Ph. D. A few colleges and conservatories of music also award degrees (usually in the fine arts) to qualified students who major in the dance. Labanotation, which is the method of writing down dance routines and is comparable to writing an orchestral score, is one of the advanced courses taught. Knowledge of this is especially important to choreographers.

A student who elects a dance major in college will no doubt have had some prior basic dance training. College age students are too old to begin toe dancing, but this is not required in modern dance. For college graduates, careers as performers may be shorter because of a later start, but their college education is an advantage in obtaining employment in teaching professional dancing or in choreography.

For teaching in the professional schools, experience as a performer is usually necessary; in colleges and conservatories, graduate degrees are generally required, but often experience as a performer may be substituted. Maturity and a broad educational background are also important for these positions.

Excellent health and unusual physical vitality are necessary for a dancing career. Height and body build should not vary much from the average. Good feet with normal arches are required. These physical qualifications must be accompanied by unusual talent for dancing.

For women dancers, employment in ballet companies is very difficult to obtain after the age of 30, except in the case of a few outstanding stars, and for many women, such employment ends even earlier than this. Men who are ballet dancers, and men and women who perform in modern dance productions, can usually continue somewhat longer. After the employable age as performers has been past, some dancers teach in schools of the ballet in colleges, or conservatories, or establish their own schools. The few who become choreographers or dance

directors can continue working as long as people in most other occupations.

### Employment Outlook

Competition for performing jobs has been great and employment very irregular in this profession for many years, and this situation is likely to persist. The supply of trained dancers has always exceeded the demand, which has been decreasing year after year. The number of stage productions has decreased because of the competition of the motion picture industry, which in turn has been adversely affected by television. Very few stage shows have a run of 26 weeks or more, and many "fold" after the first week. Thus, dancers seldom have anything like full employment. In fact, most of them had only about 10 to 12 weeks of employment as performers during all of 1959, and a similar number in other recent years.

During the 1960's, employment opportunities for dance performers will probably remain limited. The number of musical shows produced for the stage and motion pictures, will probably continue to decline. Although television will offer some additional employment opportunities, technical problems must be solved before this medium can be fully satisfactory for large-scale dance productions. Civic and community dance groups are increasing in number, but these still represent only a small field of employment for professional dancers. Most of the openings for dance performers in the years ahead will stem from the need to replace dancers who leave the field.

The employment outlook for dancers who have the personal and educational qualifications for teaching will be much better than for those trained only as performers. The growing interest in the dance as one of the fine arts is one of the reasons why the supply of people seeking to become professional dancers continues to exceed the number of openings for performers. On the other hand, it also contributes to the demand for teachers of dancing and for dance productions. The increase in college enrollments will be another factor which will tend to enlarge teaching opportunities. (See statement on College and University Teachers.)

Men dancers face less competition for employment than do women dancers, since fewer men than women seek dancing as a career and nearly equal numbers are needed.

### Earnings and Working Conditions

Dancers who perform professionally are members of one of the unions affiliated with the Associated Actors and Artistes of America (AFL-CIO). The American Guild of Musical Artists, Inc., is the union to which dancers belong who perform in opera ballets, classical ballet, and modern dance. Dancers may also belong to other unions depending upon the field in which they perform. (See statement on Singers and Singing Teachers.) Minimum salary rates, hours of work, and other conditions of employment are spelled out in basic agreements signed by the unions and the producers. In addition, each dancer signs a separate contract with the producer of his show which has to be at least as favorable in the matter of salary, hours of work, and working conditions as the basic agreement.

The minimum salary for dancers in ballet and other stage productions was \$100 a week, as of mid-1960. The minimum rate rehearsal time was \$75 a week. When a show goes on tour, salaries are increased, since dancers pay their own hotel bills. The employer pays the cost of first-class transportation. If a dancer signs a contract for a brief appearance—for instance, for a performance on television or a few days' work in a movie—the minimum rate is higher, relative to time worked. However, this difference is offset by the brevity of the engagement and the long period likely to be spent waiting for the next one. A few performers, of course, have much higher salaries. For principals, choreographers, and stars, salaries in stage production ranged from \$200 to over \$2,000 per week in 1960.

Because most dancers are employed as performers only a small part of the year, their annual earnings are much less than would be expected from these weekly rates. According to union records, about half of all dancers employed in 1959 earned less than \$2,000 from all

professional performances on the stage, in motion pictures, and on television. Only about 3 percent earned more than \$10,000. Some dancers qualified to teach in the technical schools of the ballet are able to combine this work with engagements as performers. A much greater number have to supplement their incomes by such jobs as office work, waiting on tables, or babysitting while waiting for a new contract.

Salaries of teachers in the technical schools of the ballet vary with the location and prestige of the school. Dancers employed as teachers in colleges and universities are paid on the same basis as other faculty members. (See statement on College and University Teachers.)

The performing dancer has a normal work-week of 40 hours, and overtime is paid for any additional hours. In stage productions, the number of performances may not exceed eight in any one week, but the dancers have to spend some time every day in practice. Most stage performances are, of course, in the evening, and rehearsals may require very long hours, often on weekends and holidays. When shows are on the road, traveling over the weekend is often required.

Dancers are entitled to some paid sick leave and to various health and welfare benefits provided by their unions and to which the employers contribute.

### Where To Go for More Information

Information on colleges and universities and conservatories of music which provide for a major in the dance, or some courses in the dance, and details on the types of courses, and other pertinent information may be obtained from the Dance Directory, 1961-1962, compiled by the American Association for Health, Physical Education and Recreation, a division of the National Education Association, 1201 16th St., NW., Washington 6, D.C.

Information on hours, earnings, and working conditions may be obtained directly from the unions which organized dancers in the various entertainment media.



# OTHER PROFESSIONAL AND RELATED OCCUPATIONS

## Architects

(D.O.T. 0-03.10)

### Nature of Work

Architects plan buildings and other structures and supervise their construction. Their goal is to design structures which are safe, useful, and pleasing in appearance.

When an architect receives a commission for a building, he meets with the client to discuss the requirements and cost limitations of the structure as well as the client's preferences as to style and plan. Subsequently, the architect must make hundreds of decisions concerning the details of the project. For example, if a school is to be built, the architect must decide, among other things, the entrances and exits needed in case of fire; the amount of corridor and staircase space required to enable students to move easily from one class to another; the type and arrangement of storage space; and the location, size, and interior arrangements of the classrooms, laboratories, lunchroom, and gymnasium.

After studying all the requirements of a building, the architect draws up preliminary plans, which are submitted to the client for his approval. Alterations suggested by the client are usually incorporated in the final design, which includes the ground and floor plans as well as drawings of the exterior of the building. The final design is then translated into working drawings, which show the exact dimensions of every part of the structure and where the plumbing, heating, electrical, air conditioning, and other equipment are to be placed. In preparing these working drawings, the architect must take into account local and State building codes, zoning laws, fire regulations, and other ordinances.

Before the working drawings are completed, consulting structural, mechanical, electrical,

and heating engineers are called in (except on small jobs where engineers employed by the plumbing and heating contractors may provide the engineering services needed). The engineers' mechanical drawings are then coordinated with the architect's working drawings, and additional specifications are prepared listing the materials to be used in construction, the equipment, and, in some cases, the furnishings.

The building is now "off the board," but the architect's responsibility is by no means ended. He prepares a list of the building contractors to be invited to bid on the job, receives their sealed bids, and then assists the client in de-



*Architect submitting plans of new building for client's approval.*

ciding which bid to accept. The architect also aids in drawing up the contract between client and contractor and acts as the client's advisor and representative in dealings with the contractor. As construction proceeds, the architect makes periodic inspections of the project to make certain that the design is not altered and that the materials specified in the contract are used in the construction. If problems arise between his client and the contractor, the architect may be called on to help settle the dispute. Not until the project is finished, all required tests made, and guarantees received from the contractor is the architect's work completed.

Most architects plan and design a wide variety of structures, ranging from schools and churches to hospitals and bus terminals. However, some architects may become specialists in the design of one particular class of structure, such as educational, residential, commercial, or industrial buildings.

In large architectural firms, or when working on large-scale projects, architects frequently specialize in one phase of architectural work, usually design, specification writing, or construction supervision. Most architects employed in large architectural firms, however, prepare working drawings of the various projects, the scope of their activity and the degree of their responsibility depending on their ability and experience.

### **Where Employed**

An estimated 26,000 registered (licensed) architects were employed in the United States in 1960. In addition, several thousand people who had not received a license were working in positions requiring architectural training. Although there are some outstanding women architects, only 1 percent of the registered architects are women.

Approximately half of all architects are self-employed, either practicing individually or as members of a firm of architects. Most of the others are employees of architectural firms. Some architects work for engineers, builders, real estate firms, and other businesses with large construction programs. A small number are employed by government agencies. Another

small group are full-time teachers in schools of architecture. A few architects are employed in fields related to architecture, such as city and community planning, urban redevelopment, and sales engineering.

Members of the profession are located in all parts of the country, primarily in metropolitan areas. In recent years, more than half of the registered architects have been in the following seven States: New York, California, Illinois, Pennsylvania, Texas, Ohio, and New Jersey.

### **Training and Other Qualifications**

A license for the practice of architecture is required by law in all States and the District of Columbia. In general, the purpose of these laws is to insure that architectural work which may affect life, health, or property is done by qualified architects. Requirements for admission to the licensing examination are set by the individual States. In general, the requirements include graduation from a recognized professional school followed by 3 years of practical experience in an architect's office. As a substitute for architectural school training, however, most States accept longer periods of practical experience, usually 10 to 12 years.

Professional training in architecture was offered in 1960 by 71 colleges and universities in the United States, 51 of which were accredited by the National Architectural Accrediting Board. The great majority of these collegiate schools of architecture offered a 5-year curriculum leading to the bachelor of architecture degree.

Most schools of architecture admit qualified high school graduates who meet the entrance requirements of the liberal arts college with which the school of architecture is associated. Some schools, however, require 1 or 2 years of preprofessional education in a college or university, followed by 3 or 4 years of architectural training. In general, architectural schools prefer that students' preparation include mathematics, science, social studies, language, and art. Training or ability in both freehand drawing and drafting are important tools for an architect, though not a requirement for entering a course in architecture.

A typical curriculum in architecture includes not only architectural courses but also other subjects—usually English, mathematics, physics, chemistry, sociology, and economics. Some examples of technical and professional courses included in an architectural curriculum are: Architectural design, working drawings, specification writing, graphic presentation, free-hand drawing, the history of architecture, professional ethics, and business practices.

Success in the profession requires an unusual combination of abilities—a capacity to master technical problems, a gift for artistic creation, and a flair for business and for human relations. To determine their interests and potentialities, young people should, if possible, spend some time in an architect's office before entering architectural school. Architectural students are also encouraged to work for architects or for building contractors during summer vacations. Such work gives the student some knowledge of practical problems and an advantage over the inexperienced graduate when he looks for his first regular job.

After completing his architectural school training, the new graduate usually begins as a junior draftsman in an architectural firm, assigned mainly to making drawings and models of building projects or to the drafting of details in the working drawings. As he gains experience, he is given added responsibility and is entrusted with more complex work. After about 3 years, he may progress to chief or senior draftsman, with responsibility for all the major details of a set of working drawings. He may become a construction supervisor or a job captain. As a job captain, he has the responsibility for a full set of working drawings and the supervision of other draftsmen and may also draw up the preliminary plans for a structure. Some men become designers rather than job captains or construction supervisors, whereas others branch off into the field of specification writing. An employee who is particularly valued by his firm may be designated an associate and may receive, in addition to his salary, a share of the profits. Usually, however, the architect's goal is to establish his own practice. About half ultimately achieve this goal.

### Employment Outlook

Employment opportunities for architects are expected to be favorable through the mid-1960's, and continued growth in their employment is anticipated over the long run.

Since most architects work on nonresidential projects—office buildings, stores, schools, hospitals, government buildings—the demand for architects' services depends primarily on the volume of such construction. Nonresidential construction is expected to increase considerably in the future; by 1970, the volume may be about 80 percent greater than in 1959. Residential construction, a relatively small but growing area of work for architects, is also expected to increase; in 1970, it may be roughly 40 percent greater than in 1959. Moreover, the increasing size of modern nonresidential buildings and homeowners' growing awareness of the value of architects' services are expected to bring about a greater amount of architectural planning. City and community planning projects, another growing area of employment for architects, are also expected to increase considerably over the next decade. Therefore, the demand for architectural services should expand substantially during the 1960's. In addition to positions created by the expected increase in demand for architectural services, more than 500 openings are likely to arise each year owing to retirements and deaths.

Along with the anticipated growth of employment in the profession, a rise in the number of architectural graduates is likely to occur. Assuming that graduations in this field follow the trend expected in college graduations as a whole, the number of architectural degrees awarded each year during the 1960's should be considerably greater than the 1,700 degrees awarded in 1959. If the construction industry expands as anticipated, however, new architectural graduates should have favorable employment opportunities through the mid-1960's, at least. On the other hand, a long period of reduced construction activity would seriously reduce employment opportunities for architects.

The outlook for women architects is less favorable than for men. Over the next decade, it is anticipated that women who are good drafts-

men will be able to obtain employment readily. However, the possibilities of advancement are limited for most women architects, and very few achieve an associationship or establish themselves in private practice.

### Earnings and Working Conditions

Starting salaries for architectural school graduates ranged from \$80 to \$120 a week in 1960, according to available information. Draftsmen with 3 or more years' experience had salaries ranging from \$100 to \$150 a week; job captains, specification writers, and other senior employees earned up to \$200 a week. Senior employees often receive yearly bonuses in addition to their salaries.

Architects in private practice generally earn considerably more than high-paid salaried employees of architectural firms. The range in their incomes is very wide, however. Some architects with many years of experience and good reputations earn well over \$25,000 a year, while many architects who have only recently entered private practice have very low incomes. Young architects who start their own practices often go through a period when their expenses are greater than their income and need a financial reserve to tide them over the first years of independent practice.

### Where To Go for More Information

The American Institute of Architects,  
1735 New York Ave. NW., Washington 6, D.C.

## Commercial Artists

(D.O.T. 0-44)

### Nature of Work

Illustrations designed to catch the eye of the reader and to stimulate interest in a particular product are found in most newspapers, magazines, and other publications. These drawings are prepared by commercial artists who also create television and movie cartoons, fashion illustrations, greeting card illustrations, packaging and wallpaper designs, as well as many other kinds of artwork.

Commercial art includes work at different levels of skill. Some artists do routine but essential tasks such as "pasting-up"—cutting and pasting together the basic parts of an advertisement or other artwork. The majority are "general boardmen" who spend nearly all their time over the drawing board—sketching, lettering, retouching photographic prints, preparing charts and maps, cartooning, or performing other art assignments. Other artists, called layout men, carry out art projects, planning the selection and arrangement of illustrations and lettering and determining color and other elements of design. Still other artists work as letterers, executing appropriate lettering either freehand or with the use of mechanical aids, or as illustrators who make sketches



*Commercial artist painting magazine cover with oil paints.*

and drawings. Art directors and designers develop ideas for art programs. Art directors also buy and sell the artwork of others for use in their programs and supervise an office staff.

### Where Employed

At least 50,000 commercial artists were employed in this country in 1960. About one-fourth of these were women. Many commercial

artists work as freelance artists, selling their artwork to any available customers—chiefly advertising agencies, commercial art studios, printing and publishing firms, television and motion picture studios, and department stores. In addition, some commercial artists are employed as staff artists on a regular salaried basis by each of these types of organizations and also by sign shops, mail-order houses, greeting card companies, and a variety of other business establishments. A number work for Federal Government agencies, principally the Departments of the Army, Navy, and Air Force. Commercial artists teach in art schools. Some commercial artists who hold salaried positions also do freelance work.

Most commercial artists are employed in big cities, such as New York, Chicago, Philadelphia, Los Angeles, and Detroit, where the largest users of commercial art are located. Some are employed, however, in nearly every city.

#### **Training, Other Qualifications, and Advancement**

Artistic ability is the most important qualification for work in the field of commercial art, but training in its techniques is also essential. Extensive educational training in the fine arts—painting, sculpture, or architecture—and also in academic studies provides a good foundation not only for obtaining employment as a commercial artist but especially for qualifying for promotions to higher level jobs. Training in these subjects, however, should be supplemented by specialized courses in commercial and applied art.

The most widely accepted training for commercial art is the instruction given in art schools or institutes that specialize in commercial and applied art. To enter art school, a high school education is usually, but not always, required. Some schools admit only those applicants who demonstrate talent by submitting acceptable work samples. The course of study, which may include some academic work, generally takes 2 or 3 years, and a certificate is awarded on graduation. A growing number of art schools, particularly those in or connected with universities, require 4 or more years of study and confer a bachelor's degree—com-

monly the bachelor of fine arts (B.F.A.) degree. In these schools, commercial art instruction is supplemented by courses in such liberal arts subjects as English and history. Some training in commercial art may also be obtained through courses offered by public vocational high schools and through practical experience on the job.

The first year in art school may be devoted primarily to the study of fundamentals—perspective, design, color harmony, composition, and use of pencil, crayon, pen and ink, and other art media. Subsequent study generally includes drawing from life, advertising layout, lettering, typography, illustration, and highly specialized courses in the student's particular field of interest.

Accomplished draftsmanship, creative imagination, and artistic judgment concerning the harmony of color and line are basic requirements for a successful career in commercial art. The various specialties, however, differ in some of the specific abilities required. For example, letterers and retouchers must be able to do precise and detailed work requiring excellent coordination, whereas illustrators and designers need imagination, a distinctive art style, and, in most cases, the ability to draw well. Some experience with photography is useful to those interested in design jobs. For commercial artists engaged in freelance work, the ability to sell both ideas and finished work to employers or clients is very important. Art directors need a strong educational background not only in art and business practices, but also in general liberal arts subjects.

Beginning commercial artists usually need some on-the-job training before they can qualify for other than strictly routine work. Advancement is based largely on the individual's artistic talent, creative ability, and education. After a few years of experience, many commercial artists leave salaried employment for freelance work.

Often commercial artists assemble their best artwork into a folder, or "portfolio," to use in displaying their work to others. A good portfolio is of great importance to both beginning and experienced artists in obtaining initial

employment and freelance assignments as well as in changing jobs.

### Employment Outlook

Employment and advancement opportunities for talented and well-trained commercial artists are expected to be good through the mid-1960's. Young people with only average ability, however, will encounter competition for beginning jobs and will have limited opportunity for advancement. Jobs as illustrators, designers, and art directors will continue to be few in number, much sought after, and open only to the talented, creative, and experienced artists.

A moderate increase in employment of commercial artists is expected over the long run. The upward trend in business expenditures for all kinds of visual advertising will be reflected in a growing demand for commercial artists; television animations and packaging design are expected to offer expanding areas of employment; and other forms of art such as poster and window displays, greeting cards, and movie cartoons will probably offer employment for an increasing number of artists. In addition, the growing field of industrial design is expected to need more artists who are qualified to work with engineering concepts. Although the greater use of photography may continue to displace illustrators in a few types of work, a growing demand for illustrators' services is expected in television and other fields.

Generally, the effect of a serious economic downturn would be a reduction in advertising budget and a decrease in employment of commercial artists. However, during minor business recessions, the policy of many companies is to push their products more vigorously through the use of advertising art.

Women with exceptional artistic talent will continue to find employment in all aspects of commercial art work. The textile industry will offer many opportunities, since it hires women almost exclusively for designing. Work as fashion illustrators in department stores will continue to be another major source of employment for women artists. Some will do freelance work, and others will obtain positions with printing and publishing houses, greeting

card companies, advertising agencies, commercial art studios, and government agencies.

### Earnings and Working Conditions

Inexperienced commercial artists typically earned between \$50 and \$80 a week, in 1960, according to limited data available. Talented artists with strong educational backgrounds and a good "portfolio," however, sometimes started at higher salaries. After a few years of experience, qualified artists may expect to earn \$100-\$125 or more a week. Art directors, designers, executives, well-known freelance illustrators, and others in top positions generally have much higher earnings, many beyond \$15,000 a year.

The earnings of freelance artists have an especially wide range, since they are affected by such factors as the amount of artwork sold, the price that the individual artist receives for his work, and the nature of the work he performs. For example, a recent private survey indicates that a freelance illustrator may receive from \$25 for a single fashion sketch to \$750 for a color figure with a background; from \$1,000 to \$4,000 for a color cover for a national magazine; or from \$75 to \$250 for a book jacket. Sometimes freelance artists are paid for their services by the hour; letterers may be paid by the word.

Salaried commercial artists generally work 35 to 40 hours a week, but sometimes they must work long hours under a considerable amount of pressure in order to meet deadlines. Freelance artists usually have irregular working hours.

### Where To Go for More Information

Information on art training and employment trends is available from:

National Society of Art Directors,  
115 East 40th St., New York 16, N.Y.

A list of schools offering highly specialized education in art and design is available from:

National Association of Schools of Art,  
50 Astor Pl., New York 3, N.Y.

## Draftsmen

(D.O.T. 0-48)

### Nature of Work

In making an airplane or a house, a ship or a television set, a bridge or an electric iron, manufacturing and construction companies need detailed plans giving dimensions and specifications for the entire object and each of its parts. The workers who draw these plans are draftsmen. Their drawings translate the ideas and calculations of engineers into complete and accurate working plans which are used by skilled craftsmen in making the desired object.

Draftsmen in high-grade positions, such as that of design draftsman or senior draftsman, generally work from rough sketches, specifications, or field notes furnished by an engineer, architect, or designer. Their job is to transform ideas into precise drawings, generally called layouts. They must have enough background in engineering, architecture, and science so that the desired design, as outlined in rough sketches by an engineer or others, will be accurately represented in their drawings. They may be required to make calculations concerning the strength, reliability, and cost of materials; to use engineering handbooks and tables for computations; and to have still other skills, including facility with drafting instruments and devices. In addition, draftsmen in high-level jobs must be able, through their drawings and specifications, to describe exactly what materials and processes skilled craftsmen are to use on a particular job. Some draftsmen in top positions do independent designing or act as supervisors.

From the layouts prepared by design draftsmen, working drawings are made of details or parts of the machine or article to be manufactured or structure to be built. Draftsmen who do this work are usually known as detailers. Their job also requires considerable experience and training. Other experienced draftsmen designated as checkers carefully examine each drawing for errors. A less skilled group of workers are the tracers who may be employed, often in beginning jobs, to make corrections and to prepare drawings for reproduc-



*Draftsmen translate engineers' sketches into exact drawings.*

tion by tracing them on transparent cloth, paper, or plastic film. However, in recent years, photoreproduction has been rapidly eliminating the need for tracing.

Practically all draftsmen specialize in some particular field of work. The largest fields are mechanical, electrical, electronics, aeronautical, structural, architectural, naval architectural, and topographical drafting.

### Where Employed

An estimated 225,000 draftsmen were employed in the United States in 1959. More than 85 percent of these workers were employed in industry, chiefly in manufacturing. The manufacturing industries which employ the largest numbers of draftsmen include machinery, electrical equipment, aircraft and parts, fabricated metal products and ordnance, primary metals, petroleum products and extraction, professional and scientific instruments, and chemicals and allied products. Substantial numbers are also employed by engineering and architectural con-

sulting firms, construction companies, and transportation and other public utilities.

Sizable numbers of draftsmen work for Federal, State, and local governments. Of those employed by the Federal Government, the large majority work for the Departments of the Army, Navy, and Air Force.

### **Training and Other Qualifications**

A person can acquire the specialized training needed to become a draftsman from a number of sources, including technical institutes, junior colleges, extension divisions of universities, colleges offering special 2-year programs, technical high schools, correspondence schools, and vocational and trade schools. It is also possible to become a draftsman by serving a 3- or 4-year apprenticeship or by some other type of on-the-job training combined with part-time schooling. In any case, the training should include mathematics and physical sciences, as well as mechanical drawing.

Because many of the higher level drafting jobs require a knowledge of manufacturing or construction methods, instruction in shop practices and even the actual acquisition of some shop skill are advantageous to the person interested in a drafting career. Many technical schools offer training in various areas of technology, which includes shop practice and courses in engineering and science as well as instruction in drafting.

Draftsmen should have aptitude for detail and for visualizing objects of two or three dimensions. Artistic ability is not generally required, but may be very helpful in some specialized fields. Good eyesight is important, since drafting involves close work.

### **Employment Outlook**

Employment opportunities for well-trained draftsmen are expected to be favorable during the mid-1960's. Although photoreproduction of drawings and newly developed electronic equipment may eliminate some routine tasks done by draftsmen, continued expansion in the employment of well-qualified draftsmen is anticipated over the long run. As the engineering and scientific occupations grow, more draftsmen will

be required as supporting personnel. Moreover, the industries employing most draftsmen are expected to expand further. With the increasing complexity of industrial operations, design problems will become more and more involved, adding to the need for well-trained draftsmen. In addition to draftsmen needed to fill new positions, many will be required each year to replace those who retire, die, or move into other fields of work. Losses to the occupation from retirements and deaths alone were estimated to be about 2,000 during 1960 and will rise slowly in the future.

This analysis, like that for most technician jobs, assumes a continued high level of employment and of business activity in the country as a whole. It also assumes that Government-spending for defense—a major factor affecting demand for draftsmen—will remain high. A substantial cut in defense spending or a sharp drop in business activity in the metalworking, electrical equipment, or construction industries would reduce the demand for draftsmen. On the other hand, a substantial increase in defense expenditures or an acceleration in highway or other public works programs would intensify the demand.

### **Earnings**

Weekly earnings averaged \$72.50 for tracers and \$90 for junior draftsmen in metropolitan areas in the winter of 1959-60. For senior draftsmen, the average was \$120 and for lead draftsmen, \$146.

In the Federal Civil Service, the entrance salary in trainee draftsman positions was \$3,500 in 1960 for high school graduates without work experience. For those with post-high-school education or experience in drafting, entrance salaries were higher. The majority of experienced draftsmen working for the Federal Government earned between \$4,300 and \$6,400 in 1960, and some earned still higher salaries.

### **Where To Go for More Information**

American Federation of Technical Engineers,  
900 F St. NW., Washington 4, D.C.

See also section on Where To Go for More Information in the chapter on Technicians. (Refer to index for page number.)



## Foresters

(D.O.T. 0-35.07)

### Nature of Work

Forests are one of America's greatest natural resources, covering more than one-fourth of the land area of the country. Foresters protect, manage, and develop these valuable properties. Safeguarding forests from fire, destructive insects, and diseases is one part of their work. Other important duties include reforestation, estimating the amount of timber in a forest area and appraising its value, selling or buying timber, and planning and supervising the cutting of timber so that mature trees are removed and younger ones left for future logging operations. Some foresters, called *forestland managers*, are also responsible for additional resources and activities, such as camps and parks, wildlife, and grazing land.

Because the work of the forester covers such a wide range of activities, numerous specialties have developed. Included among these are wildlife management, range management, forest economics, and recreation work. Foresters may also specialize in such activities as research, writing and editing, extension work (providing information about scientific forestry practice to farmers, logging companies, and the public), and teaching at the university level. Some of the specialties are increasingly becoming recognized as distinct professions. For example, *wood technologists* study the physical and chemical properties of wood, develop new uses for wood, and bring about better utilization of wood and its byproducts.

### Where Employed

An estimated 19,000 foresters were employed in forestry and closely allied fields in the United States in 1960. About half of these were in private industry, working mainly for pulp and paper, and logging, lumbering, and milling companies. Some were in business for themselves as consultants or as managers of their own land. Although there were only a few hundred forest consultants, this field repre-



Courtesy of U.S. Forest Service

*Forester measuring tree marked for cutting.*

sents a growing source of employment for professional foresters.

About one-third of the foresters were employed by the Federal Government, mainly in the Forest Service of the U.S. Department of Agriculture. Some were employed by the Department of the Interior, and a few by other Federal agencies, including the Tennessee Valley Authority and the Department of Defense. Approximately 2,000 foresters worked for State governments, and the remainder were employed chiefly by educational institutions and local governments.

### Training and Other Qualifications

A bachelor's degree in forestry is usually the minimum educational requirement for beginning positions in forestry. Training in forestry leading to a bachelor's or higher degree was offered in 1960 by 43 colleges or universities, 28 of which were accredited by the Society of American Foresters. The curriculums in most

of these schools include specialized forestry courses in five essential areas: (1) silviculture (methods of growing and improving forest crops); (2) forest protection (primarily from fire, insects, and disease); (3) forest management (the application of business methods and technical forestry principles to the operation of a forest property); (4) forest economics (study of the factors affecting the supply of and the demand for forest products); and (5) forest utilization (the harvesting and marketing of the forest crop and other forest resources). In addition to these forestry courses, the curriculums also include courses in science, engineering, economics, and the humanities. The great majority of colleges require that students spend one summer in summer camps operated by the college. Forestry students are also encouraged to work other summers in order to gain firsthand experience in forest or conservation work.

Most schools of forestry offer an additional year of training leading to the master's degree and some offer doctoral training. Although graduate training is not essential for entrance into the profession, the master's degree is generally required for teaching or research positions and the doctorate is highly desirable for such posts.

A small number of foresters have entered the profession with training primarily in a related field such as horticulture, botany, agronomy, or other biological sciences. Also, specialists in forest engineering have entered with engineering degrees, and forest product technologists and specialists in the utilization of wood and wood products have entered the field with degrees in chemistry, physics, or engineering. However, the attainment of professional status without a degree in forestry is becoming more and more difficult.

In addition to adequate training, qualifications for success in forestry include the ability to meet and deal effectively with people. Many jobs also require the ability to endure vigorous physical activity, and a willingness to work in isolated areas.

### Employment Outlook

Employment opportunities for forestry graduates are expected to be favorable through the mid-1960's. As in recent years, there will probably be particular need for well-qualified personnel with advanced degrees for research and teaching positions.

The longrun outlook is for fairly rapid expansion of employment in forestry. The country's growing population and rising living standards will tend to increase the demand for lumber, paper, and other major forest products, although the demand for these products will also be influenced by any changes in the general level of business activity affecting construction and other major wood-using industries. In addition, the large-scale application of scientific forestry practices to forest lands, both public and private, is expected to increase over the next decade. Moreover, fields closely allied to forestry—such as wildlife management, wood utilization, watershed management, forest recreation, and range management—have grown rapidly in the past and should continue to provide many new positions in both government and private industry.

Private and industrial owners of timberland are expected to offer numerous employment opportunities to foresters during the next decade, primarily because of the expected increase in the demand for wood and wood products. The forest products industries are becoming increasingly aware of the profitability of improved forestry and logging practices and are making use of new technical developments for utilizing the entire forest crop. Technical developments are also expected to make it possible to cut timber in forests now regarded as unprofitable for timber operations. In addition, competition from metal, plastics, and other materials is expected to stimulate further research and development in wood utilization and technology to reduce costs and develop new and improved products.

Employment of foresters in the Federal Government is also expected to grow in the next decade. The Forest Service of the U.S. Department of Agriculture anticipates that its employment of foresters will grow at a rapid rate in the future. Among the major factors

which are expected to bring about this growth are the increasing volume of timber cut on Federal lands, and the trend toward more scientific management of these lands.

State Government agencies are also expected to expand their employment of foresters. Forest fire control and other Federal-State cooperative programs, such as providing technical advice to owners of private forest lands, are being channeled more and more through State organizations. Growing demands for recreation facilities in forest lands are likely to result in expansion of State parks and other recreation areas.

In addition to openings created by the growing need for professional foresters, some vacancies will occur as a result of retirements and deaths. However, such openings will not be numerous during the 1960's, since foresters are a relatively young group.

Along with the anticipated growth of employment in the profession, a rise in the number of forestry graduates is likely to occur. If young men with degrees in forestry continue to represent the same proportion of all college graduates as in recent years, by 1970, the number of bachelor's degrees granted in forestry may be almost twice the number conferred in 1959. Graduating classes of this size may encounter competition for the better paying professional entry jobs in forestry.

Opportunities for women in the profession of forestry are and probably will continue to be limited, largely because of the necessary field work, much of which is rigorous and in isolated places. The few women presently employed in forestry are engaged chiefly in research, and future opportunities for women are also likely to be primarily in this field.

### **Earnings and Working Conditions**

The average (median) salary of beginning foresters employed by private industry was about \$5,300 a year in 1959, according to the Society of American Foresters. In State Government positions, beginning salaries averaged about \$4,800 a year. Starting salaries for forestry teachers in colleges and universities averaged about \$5,100 a year.

In Federal Government positions in late 1960, foresters with bachelor's degrees and no experience could begin at either \$4,345 or \$5,355 a year, depending on their college record. Inexperienced foresters with 1 full year of graduate study could begin at \$5,355; those with 2 full years of graduate study at \$6,435. New graduates with the Ph. D. degree were eligible to start at \$7,560 or \$8,955.

Within a particular field of employment, foresters with Ph. D. degrees usually have higher starting salaries than those with bachelor's or master's degrees. Furthermore, throughout their working life, foresters with the doctor's degree tend to have higher average earnings than those with bachelor's or master's degrees.

Regardless of the field in which they are employed, most foresters can look forward to a marked increase in earnings as they gain experience. For example, in private industry in 1959, the average salary of foresters with between 21 and 25 years of experience was more than double that of beginning foresters.

As part of his regular duties, the forester must spend considerable time out of doors under all kinds of weather conditions. Many foresters put in extra hours in travel and in emergency duty such as firefighting. Beginning foresters, in particular, are often required to travel for extended periods of time. The young forester is also likely to be shifted frequently from one headquarters to another. With advancement to more responsible positions, he can expect a more permanent assignment.

### **Where To Go for More Information**

Society of American Foresters,  
425 Mills Bldg., 17th and Pennsylvania Ave. NW.,  
Washington 6, D.C.

Forest Service, U.S. Department of Agriculture,  
Washington 25, D.C.

American Forest Products Industries, Inc.,  
1816 N St. NW., Washington 6, D.C.

National Lumber Manufacturers Association,  
1319 18th St. NW., Washington 6, D.C.

The U.S. Civil Service Commission, Washington 25, D.C., will furnish information on positions available in Federal Government agencies. (For further information on such positions and how to apply for them, see chapter on Government Occupations.)

## Geographers

(D.O.T. 0-36-93)

### Nature of Work

Geographers seek knowledge about the distribution throughout the world of people and natural resources. They study the physical characteristics of the earth, such as its terrain, minerals, soils, water, vegetation and climate. They also study the activities of people—where they live, why they are located there, and how they earn a living.

Most geographers specialize in one of the several main branches of geography. Those working in *economic geography* deal with the geographic distribution of economic activities—including manufacturing, mining, farming, trade, and communications. *Regional geographers* are concerned with all the physical, economic, political, and cultural characteristics of a particular region or area. The area under analysis may range in size from a river basin or an island, to a State, an entire country, or even a continent. Those specializing in *physical geography* study the earth's physical characteristics. Geographers in the field of *cartography* are concerned with the planning and construction of maps, as well as the compilation of data for them.

Most geographers are engaged in college teaching or in research, and many do both. Their research may include the study and analysis of the distribution of soils, vegetation, land forms, climate, and mineral and water resources, sometimes utilizing surveying equipment and meteorological instruments. They also analyze political organizations, transportation systems, and economic activities. Some geographers spend much time in field study and in interpreting statistics, preparing statistical tabulations, and analyzing aerial photographs and data collected in the field. They often construct and interpret maps, graphs, and diagrams.

Except for those in university positions, relatively few professional workers in the field of geography have the title of geographer. Many have job titles which describe their specialization, such as map cataloger, cartographer, or regional analyst. Others have titles relating

to the subject matter of their study, such as photointelligence specialist or climatological analyst. Still other geographers have general job titles, such as community planner, market or business analyst, or intelligence specialist.

### Where Employed

Geography is a relatively small field of employment. Only about 2,000 geographers, less than 10 percent of whom were women, were employed in the United States in 1960.

Well over half of all geographers are employed by colleges and universities. Some teach in institutions which do not have a separate department of geography and so are assigned to departments of geology, economics, or other physical or social sciences.

The second largest field of employment is the Federal Government, which employs about one-fourth of all geographers, mostly in the Washington, D.C. area. Among the major Government agencies employing these workers are the Departments of Defense, Commerce, Agriculture, the Interior, and State; and the Central Intelligence Agency. State and local governments also employ a number of geographers, mostly on city and State planning and development commissions.

Most of the small but growing number of geographers employed by private industry work for map companies, textbook publishers, travel agencies, manufacturing firms, chain food stores, and marketing research organizations. A few geographers work for nonprofit organizations, institutes, and scientific foundations.

### Training and Other Qualifications

A bachelor's degree with a major in geography is the minimum educational requirement for young people seeking careers as geographers. For many positions, particularly in research and teaching, a graduate degree is highly important.

Undergraduate training in geography is of-

ferred by many colleges and universities. In 1958, according to the U.S. Office of Education, bachelor's degrees in geography were awarded by about 150 institutions. Undergraduate studies usually provide a general introduction to geographic knowledge and research methods and often include some field studies. Typical courses offered are principles of geography, climatology, economic geography, physical geography, political geography, urban geography, cartography, map interpretation, and regional courses, such as geography of North America, Western Europe, the U.S.S.R., and Asia. The studies of the geography student may also include courses such as mathematics, botany, chemistry, physics, geology, economics, political science, and foreign languages.

Advanced degrees in geography are offered by a relatively small number of schools; in 1958, master's degrees were awarded by about 50 institutions; and Ph. D. degrees, by about 25. A bachelor's degree with a major in geography is the usual requirement for admittance to graduate school. However, some schools will admit students with bachelor's degrees in fields other than geography, such as economics, forestry, geology, or history. Requirements for the master's or doctor's degree include geographic field and laboratory work, as well as classroom studies, library research, and the preparation of a thesis.

New graduates with bachelor's degrees in geography find employment mainly in positions connected with mapmaking, either in government or private industry. Some obtain positions as research or teaching assistants in educational institutions while studying for advanced degrees. Those with advanced degrees usually qualify for teaching and research positions in colleges and universities and for research positions in government and private industry. The Ph.D. degree is usually essential for high-level posts in college teaching and for research and may be important for advancement to top-level positions in other activities.

### Employment Outlook

The outlook is for a moderate growth in employment of geographers, both in the near

future and over the long run. The major need will be for geographers with graduate degrees to fill research and teaching positions in colleges and universities and research jobs in industry and government.

Colleges and universities are expected to offer the greatest number of employment opportunities during the next decade, primarily owing to increases in total college enrollments anticipated during the mid-1960's. With expanding interest in foreign countries there is a growing awareness of the value of geographical training in other fields of work, such as in the foreign service. This should also result in increased enrollments in geography and in a need for additional geography teachers.

Employment of geographers in government positions is expected to increase slowly during the next decade. The Federal Government will need additional personnel in positions related to area development; resource management; planning, construction, and interpretation of maps; and in intelligence work. State government employment of geographers will probably expand also, particularly in such areas as conservation; highway planning; and city, community and regional planning and development.

The number of geographers employed in private industry is also expected to increase. Market research work, in which many of these geographers are engaged, should continue its rapid growth. Opportunities should also increase in area planning and development work, often done by private industry in cooperation with State and local governments.

Since geography is a relatively small profession, the number of job openings in any one year will not be numerous. In addition, the total number of graduates receiving degrees in geography each year is expected to increase during the next decade, well beyond the 900 bachelor's degrees, 180 master's degrees, and 51 doctorates awarded in 1959. Thus, there may be increased competition for the more desirable beginning positions in geography. On the other hand, unless the annual number of new graduates with advanced degrees in geography rises far above anticipated levels, employment opportunities for these well-trained geographers are expected to be good over the next few years.

For women geographers, the most favorable opportunities will be in teaching positions, particularly in women's colleges and in the larger coeducational institutions. Government agencies should also offer some opportunities, mainly in mapping work. Because of the field-work required for some geographic positions, however, overall opportunities for women will be somewhat less favorable than for men.

### Earnings and Working Conditions

In the Federal Government, in 1960, the usual starting salary for geographers with the bachelor's degree and no experience was \$4,345 or \$5,355 a year, depending on the individual's college record. Inexperienced geographers with 1 year of graduate training could start at \$5,355; those with 2 years of graduate training, at \$6,435; and those with the Ph. D. degree, at \$7,560. In addition, the Federal salary schedule provides for periodic increases above these basic salaries.

In colleges and universities, starting salaries

for fully trained geographers—those with the Ph.D. or with all the requirements for the doctorate except the thesis—were usually between \$6,000 and \$7,000 a year in 1960, according to the limited information available. Many experienced geography professors were earning from \$9,000 to \$15,000 a year in 1960. Geographers in educational institutions often have an opportunity to add to their teaching salaries through consulting work, special research projects, and publication of books and articles.

Geographic research sometimes requires extensive travel, in foreign countries as well as the United States. Geographers thus engaged are frequently away from home for long periods of time, sometimes under somewhat primitive living and working conditions. However, young people who like to travel may find this aspect of geographic work very satisfying.

### Where To Go for More Information

Association of American Geographers,  
1785 Massachusetts Ave. NW., Washington 6, D.C.

## Home Economists \*

(D.O.T. 0-12.10 through .36)

### Nature of Work and Where Employed

Persons trained in home economics are employed in a variety of occupations. They may teach home economics; become dietitians or extension service workers; or serve as home economists in business, research, or welfare work. In addition to their similar basic training, these occupational groups have a common interest in improving home products, services, and activities. Many specialize in foods, clothing and textiles, home equipment, household management, or child care. Those who do not specialize include some teachers, home demonstration agents, consultants, or counselors—whose work often requires a broad knowledge of many homemaking activities. In performing their work, home economists draw upon pertinent knowledge and skills from many other fields as, for example, chemistry, physics,

bacteriology, art, economics, psychology, journalism, and teaching.

About 80,000 persons with home economics training were employed in home economics occupations in 1959. The largest group, about 44,000, were home economics teachers. Of these, approximately 27,000 were teaching in public secondary schools, about 500 in private and parochial schools, nearly 3,000 in colleges and universities, and about 13,000 in adult education programs. (Information on teaching is contained in the statements on Secondary School Teachers and on College and University Teachers. See index for page numbers.) About 250 home economists specializing in child development or family relations were employed as teachers in nursery schools, kindergartens, recreation centers, or institutions caring for children.

Others who have received home economics training, and who were employed in 1959, in-

\* Prepared by the Women's Bureau, U.S. Department of Labor.



Courtesy of U.S. Department of Agriculture

*Home economist experimenting to determine the best roasting temperatures for frozen turkeys.*

cluded about 25,000 dietitians (see statement on Dietitians), a small number of nutritionists (engaged primarily in the study and promotion of good nutrition practices), and about 5,000 extension service workers. (See statement on Agricultural Extension Service Workers.)

*Home Economists in Business.* Of the remaining number in home economics occupations in 1959, probably between 5,000 and 6,000 were specialists employed by private business firms and associations to help promote the development, use, and care of specific home products. Home economists in this group work not only for companies which manufacture or distribute products or provide services in the home, but also for magazines, newspapers, radio, and television.

The largest group of home economists in business, possibly over 2,000 in 1959, were employed by food manufacturers to study consumer needs, to help manufacturers translate these needs into desirable products, and to provide miscellaneous consumer services. An important part of their work is done in test kitchens—developing new recipes, improving present products, or helping to create new products. They usually write directions for food packages; prepare booklets, leaflets, or cookbooks; and answer

customers' inquiries. Sometimes, they also give food demonstrations or lectures and prepare materials for television programs or film strips.

Another large group, perhaps almost 2,000, were home-service workers employed by gas or electric utility companies, including cooperatives. In talks before clubwomen, youth groups, or retailers and in private visits, these home economists often give advice on kitchen planning and laundry problems, in addition to describing the operation and benefits of their products and services. They may visit customers' homes on request or to demonstrate the operation of newly installed equipment, such as that used in cooking, heating, refrigeration, or laundering. To promote public understanding of their company's products and services, they may also answer inquiries, write newspaper articles or pamphlets, broadcast company-sponsored programs on radio or television, or conduct classes for salesmen and servicemen.

About 500 home economists, known as equipment workers, were employed by manufacturers of such household equipment as ranges, refrigerators, kitchen cabinets, cooking utensils, and laundry equipment. One of their major duties is to prepare or supervise the preparation of instructional material relating to the use and care of the manufacturer's products. They work with engineers on product development and also devise plans for product uses. Equipment workers spend a good deal of time training others—especially home-service workers, salesmen, and servicemen—concerning the characteristics of products. To do this, they sometimes travel out of town to confer with dealers and distributors. Their work may also include preparing press releases and radio and television programs.

About 400 more home economists worked exclusively in journalism, radio, and television. Gathering information from a variety of sources, they interpret trends and prepare stories on food, clothing, or other topics of interest to homemakers. They may test products themselves or evaluate the tests of others. Some regularly write food preparation or homemaking columns; others edit the home economics section of a newspaper or magazine. Those employed by radio and television stations may con-

duct their own programs or act as consultants for others. Home economists who specialize in foods may also conduct cooking courses.

Possibly over 250 other home economists were engaged in advertising and public relations work, serving on the staffs of agencies in these fields or with companies producing or distributing food products, textiles, home-furnishings, and household supplies or services. They may secure background material for advertising campaigns, test consumer products in research laboratories or test kitchens, prepare newspaper articles and photographic displays, conduct homemaking courses, or speak before various groups.

In the field of textiles and clothing, about 100 home economists held a variety of positions with dress-pattern companies, textile and clothing manufacturers, laundry and dry-cleaning establishments, and a few chain clothing and department stores. They may conduct consumer surveys or laboratory tests and report on the functional and economical characteristics of fabrics and fibers used in clothing and household furnishings. They may work as fashion coordinators, personal shoppers, or fashion designers. Those specializing in interior decoration arrange displays for business establishments or give advice on home decoration. Some enter the retail clothing field and become buyers or work up to other executive positions.

A few experienced home economists work as freelance consultants. Usually they are employed by several clients whose businesses do not require the services of a full-time home economist. Their duties may include such tasks as preparing photographic displays, doing background research for an advertising campaign, developing instructions for the use of a new product, or acting as technical adviser in the preparation of radio and television commercials.

*Home Economists in Research.* About 500 home economists perform research work in laboratories and offices of the Federal Government, State agricultural experiment stations, colleges, universities, and private organizations. The largest single group in home economics research, about 100, work for the Institute of

Home Economics in the U.S. Department of Agriculture. Engaged in research on food and nutrition, textiles and clothing, housing, household equipment, or household economics, these home economists utilize skills of a variety of fields, including chemistry, physics, biology, statistics, economics, and psychology. For example, some make farm family surveys to determine the amounts that farm families spend for such items as food, clothing, housefurnishings, and medical care. From these findings, they develop budget guides needed by home economists in teaching, family counseling, social welfare, and extension work. Other home economists perform laboratory tests to determine the effect of different methods of cooking on nutritive value, flavor, tenderness, or volume of a food. A few home economists are engaged in research on space travel, working, for example, on problems of food needs in outer space.

*Other Related Fields of Work.* About 300 home economists were employed on social-welfare programs by State, county, city, and voluntary welfare agencies. They act chiefly as advisers and consultants in the development of budget standards for needy families, helping to determine the amount of financial assistance necessary to provide minimum healthful living standards. Other home economists in welfare agencies supervise or train workers engaged in homemaker services which provide temporary or part-time help to households disrupted by illness or old age.

Training in home economics is useful in a number of other fields. Some home economists specialize in housing, advising architectural firms on home planning, equipment arrangements, and the selection of household appliances. A few are employed in such businesses as financial institutions, giving customers advice on spending and saving; moving companies, studying household moving problems; and food chain stores, providing food and household information to consumers.

A fairly new field for home economists is rehabilitation, in which they work as homemaking counselors and consultants, helping handicapped homemakers and their families ad-



just to the homemaker's handicap by changing physical arrangements in the home and revising methods of work.

Some experienced home economists are also employed abroad by the Federal Government, foundations, international organizations, colleges, and American businesses with foreign subsidiaries—primarily to work as teachers or consultants on programs aimed at promoting good practices in homemaking and contributing to higher living and educational standards.

Although home economics is generally considered a woman's field, a growing number of men are entering various home economics positions. Some men are engaged in teaching, research, merchandising, interior designing, and family counseling, but most specialize in foods and institution management.

#### **Training, Other Qualifications, and Advancement**

Four years of college study leading to a bachelor's degree in home economics is the minimum requirement for professional work in home economics. Some fields, such as nutrition, college teaching, and certain kinds of research and supervision, require a master's or a doctor's degree.

Approximately 500 colleges and universities in the country offer home economics training and grant a degree with a major in home economics. In addition to such liberal arts courses as English, psychology, economics, physiology, and chemistry, the basic courses for home economics undergraduates generally provide an introduction to all phases of home economics. The curriculum includes courses in clothing and textiles, foods and nutrition, home management, and household equipment, as well as courses in art and design, child development, and family relations. Undergraduates are advised to elect additional courses in the field of their special interest. For those wishing to specialize in foods, advanced courses in chemistry and nutrition are essential, as are science and statistics courses for research work and journalism courses for advertising and public relations work. In order to teach home economics, it is necessary to take the professional education courses required for a teacher's certificate.

During the school year 1959–60, 8,354 bachelor's degrees, 836 master's degrees, and 50 doctorates were earned in home economics or home economics education. Six percent of all baccalaureate degrees granted to women in that year were in these two subjects.

Financial assistance available to home economics undergraduates is virtually the same as that for all undergraduate students in the country, although there are some scholarships especially designated for students in this field. Significant numbers of scholarships, fellowships, and assistantships, however, are available for graduate study in home economics. Announcements for the school years 1960–61 and 1961–62 list 557 assistantships, 89 fellowships, and 36 scholarships open to graduate home economics students, according to a study by the American Home Economics Association. The typical assistantship ranged between \$1,500 and \$2,000 and required 20 hours of service a week during the school year. Fellowships for graduate students frequently ranged between \$1,000 and \$3,000 a year. Although colleges and universities offer most of these financial grants, some are provided by government agencies, research foundations, businesses, and the AHEA itself.

Besides having adequate training, home economists must be able to work with people of various living standards and backgrounds and should have a capacity for leadership with ability to inspire cooperation. Good grooming, poise, and an interest in people are also essential, particularly for those dealing with the public.

#### **Employment Outlook**

The number of home economists needed in many fields of employment is expected to continue increasing during most of the 1960's. In addition to expansion needs, a considerable amount of the demand stems from the replacement needs. Job turnover because of marriage and family responsibilities is particularly heavy among these workers, many of whom studied home economics as preparation for homemaking.

An American Home Economics Association

study has indicated that by 1965 about 10,500 additional positions for home economists will exist in education, business, extension service work, and social welfare. At the time of the study (1959), there were about 1,300 vacancies for home economists, including about 500 in public secondary schools, 320 in extension service work, 220 in colleges and universities, 130 in social welfare and public health agencies, and 100 in business.

In the field of education, the shortage of home economics teachers is especially critical in public secondary schools. More teachers are needed because of the rising enrollments in secondary schools throughout the country, the introduction of home economics courses in schools which have been consolidated from small schools previously without a home economics department, and the expansion of these departments in other schools. Moreover, it has been estimated that as many as 5,000 home economics teachers must be recruited annually as replacements.

The need for more home economists in research is expected to increase with the continued interest in using scientific methods for improving various home products and services. Similarly, in many business establishments, employers are becoming increasingly aware of the contributions of professionally trained home economists and are hiring an expanding number.

Shortages of home economists are most acute at two levels: In administrative positions (where advanced education and experience are essential) and in entrance positions. Not enough home economics graduates are entering and remaining in home economics occupations to satisfy current demand.

### **Earnings and Working Conditions**

In urban districts with 500,000 or more population, the average (median) salary of beginning teachers with a bachelor's degree was \$4,375 for the school year 1960-61, according to a National Education Association

survey; in districts with 100,000 to 499,999 population starting salaries averaged \$4,200, and in districts with 30,000 to 99,999 population, \$4,250. Home economics teachers generally receive the same salaries as other teachers, as most school districts have a single-salary schedule based on education and experience. The average (mean) salary of all secondary school teachers (including both beginning and experienced teachers) was \$5,500 in 1960-61.

Average salaries of home economists in 1960 approximated \$6,000 in business and in college and university teaching, and \$4,600 in social welfare work. In the cooperative extension service, county home demonstration agents averaged about \$6,200 per year and State specialists, \$7,500 per year.

In the Federal Government, the entrance salary for inexperienced workers with a bachelor's degree in home economics was \$4,345 in 1961. For those with additional education and experience, salaries ranged from \$5,355 to \$15,030 a year, depending upon the type of position and level of responsibility involved.

Most home economists work a regular 40-hour week or less. Those engaged in promotional and advertising work, however, may work irregular hours, as they are usually expected to be available for evening demonstrations or other nightwork. Most home economists receive such fringe benefits as paid vacation, sick leave, retirement pay, and insurance benefits.

### **Where To Go for More Information**

A list of schools granting degrees in home economics is available from the U.S. Department of Health, Education, and Welfare publication, *Home Economics in Degree-Granting Institutions*. Misc. 2557. Revised. Washington, D.C., 1960.

Additional information about home economists and available graduate scholarships, may be obtained from:

American Home Economics Association,  
1600 20th St. NW., Washington 6, D.C.

## Interior Designers and Decorators

(D.O.T. 0-43.40)

### Nature of Work

Designing and decorating the interiors of homes and other buildings was the principal activity of about 10,000 people in 1960. Interior decorators plan the selection and arrangement of furniture, draperies, floor coverings, and other decorations in private homes, so as to achieve both an artistic and functional effect. In addition, they plan the decorations of the interiors of many other structures—including offices, stores, theaters, schools, and even ships and airliners. They may also work on interiors used in theater, motion picture, and television sets. Many decorators have their own establishments, where they sell upholstery and drapery materials, furniture, and decorative accessories. Some work alone, or with one assistant; others have a large staff, sometimes including salespeople.

As a rule, decorators work directly with clients to determine their preferences and needs in furnishings; on some assignments, they may submit sketches or water color paintings of their decorating schemes, along with cost estimates. After their plans have been approved and cost estimates agreed upon by their clients, decorators arrange for the purchase of the furnishings; supervise the work of painters, floor finishers, cabinet makers, carpet layers, and other craftsmen; and take care of the installation and arrangement of furnishings.

At the top of this profession are about 300 interior designers who not only plan the furnishings and decorations for a building, but also design the complete layout of the rooms, within the space allowed by exterior walls and other framework of the structure. When these interior plans have been drawn up, the architect who planned the structure usually checks the blueprints to assure compliance with building requirements and to solve structural problems. Some interior designers design the furniture and accessories to be used in interiors, which they plan, and arrange for their manufacture.

### Where Employed

The majority of decorators are located in large cities and their suburbs—areas in which decorating services are widely used. In recent years, large retail stores have become increasingly important as a source of employment for professional decorators. Many of the larger department and furniture stores have decorating departments. One of the main functions of such departments is to help sell the stores' merchandise, although the decorators are usually permitted to use materials not carried by the stores when this is essential to their decorating plans. Department store decorators may advise the stores' buyers and executives concerning style and color trends in homefurnishings; this function is expected to become increasingly important. Some decorators have regular jobs with hotel and restaurant chains. Others are employed by architects, antique dealers, office furniture stores, industrial designers, furniture and textile manufacturers or other manufacturers in the homefurnishings field, or by periodicals that feature articles on homefurnishings.



*Interior decorator discussing decorating plan with client.*

### **Training, Other Qualifications, and Advancement**

Formal training in interior decoration is becoming increasingly important for entrance into this field of work, although many present members of the profession achieved success without such training. Most department stores, well-established decorating firms, and other major employers will accept only well-trained people for beginning jobs. Usually, the minimum educational requirement is completion of a 2- or 3-year course at a recognized art school or institute specializing in interior decorating and design or a 4-year college course leading to a bachelor of fine arts degree, with a major in interior design and decoration. The course of study in interior design and decoration usually includes the principles of design, history of art, freehand and mechanical drawing, painting, and study of the various materials, such as woods and fabrics, with which the decorator works. In addition, courses in salesmanship, business arithmetic, and other business subjects are of great value.

Membership in the American Institute of Decorators is a recognized mark of achievement in this profession. To become a member of the Institute, a decorator must usually have completed at least 4 years of education beyond high school, with major emphasis on training in design, and also have had 4 years of experience, including responsibility for supervision of all aspects of decorating contracts; decorating experience in excess of the 4-year minimum may be substituted for the required education.

New graduates with art training usually serve a training period in the field, either with decorating firms, in department stores, or in the firm of an established designer. The trainee may act as a receptionist, as a shopper with the task of matching materials or finding accessories, or as a stockroom assistant, assistant decorator, or junior designer. In most instances, from 1 to 3 years of on-the-job training is required before a trainee is considered eligible for advancement to a senior decorator job. New graduates who do not obtain such on-the-job training will find work as salespeople in fabric, lamp, or other homefurnishings stores or departments, useful experience both in dealing with customers and becoming familiar with the

merchandise. This experience often makes it easier to obtain trainee jobs with a decorating firm or department; it may also lead to a career in merchandising.

Decorators with ability and considerable experience may advance to head of a decorating department or other supervisory position as openings occur. Experienced decorators may open their own decorating establishments or move into positions as homefurnishings coordinators in department stores.

Artistic talent and creative imagination are probably the personal qualities most important for success in this field. In addition, prospective decorators should possess a business sense and sufficient physical stamina to be able to work under pressure.

### **Employment Outlook**

Well-qualified graduates who have majored in interior design and decoration will probably have good opportunities for employment during the 1960's. Young people without formal training or real aptitude for the work will, however, find it increasingly difficult to gain a foothold in the field.

A slow but steady increase in employment of interior designers and decorators is anticipated over the long run. Factors that will contribute to this expansion are the growing population, increasing expenditures for home and office furnishings of all kinds, the growing availability of well-designed furnishings at moderate prices, and growing recognition of the value of decorators' services. In addition, some vacancies will arise each year as workers retire, die, or leave the occupation for other reasons.

Department and furniture stores will continue to employ an increasing number of trained decorators. These stores are also expected to share in the growing volume of decorating work for commercial establishments and public buildings, formerly handled almost entirely by independent decorators. This development will result in increased opportunities for salaried employment of decorators. As in the past, however, a sharp downturn in general economic

conditions would adversely affect employment opportunities in this field.

Many women will continue to find employment opportunities in this field. Mature women with suitable educational and personal qualifications should be able to compete successfully, since some clients do not have confidence in youthful appearing decorators.

### **Earnings and Working Conditions**

Beginning salaries ranged from \$60 to \$75 a week in 1960 for art school or college graduates with formal training in interior design and decoration, according to limited data available.

Many experienced interior decorators earn only moderate incomes—from \$4,000 to \$5,000 a year. Others, usually interior designers, earn more than \$25,000 yearly.

Earnings of decorators in business for themselves have an especially wide range, depending on the profit from their operations. Most other experienced decorators also have rather variable earnings, since few of them are paid straight salaries. Some receive salaries plus commissions which usually range from 5 to 10 percent of the value of their sales; others receive commissions only, which may be as much as one-third of the value of their sales.

Hours of work for decorators and designers are sometimes long and irregular. They usually adjust their workday to suit the needs of their clients, sometimes meeting with them during the evenings or on weekends.

### **Where To Go for More Information**

American Institute of Decorators,  
673 Fifth Ave., New York 22, N. Y.

## **Lawyers**

(D.O.T. 0-22.)

### **Nature of Work**

Lawyers take care of many kinds of legal problems for individual clients, and for business firms and other organizations. For example, they may help with tax problems, property transactions, and accident and other claims.

Lawyers (attorneys) advise clients on their legal rights and obligations and, when necessary, represent them in courts of law. In addition, they negotiate settlements out of court and represent clients before quasi-judicial or administrative agencies of the government. They may act as trustees, guardians, or executors. Government attorneys play a large part in developing and administering Federal and State laws and programs; they prepare drafts of proposed legislation, establish law enforcement procedures, and argue cases. Some lawyers serve as judges in Federal, State, and local courts. Others are primarily engaged in teaching, research, writing, or administrative activities.

The great majority of lawyers are in general practice, handling all kinds of legal work for clients. However, an increasing number practice in a particular branch of the law—for

example, corporation, criminal, labor, patent, real estate, tax, or international law. Some attorneys devote themselves entirely to trying cases in the courts. Others never appear in court but spend all their time in such activities as drawing up wills, trusts, contracts, mortgages, and other legal documents, conducting out-of-court negotiations, and doing the investigative and other legal work necessary to prepare for trials.

Many people with legal training are not employed as lawyers but are in other occupations where they can use their knowledge of law. They may, for example, be FBI agents, insurance adjusters, tax collectors, probation officers, credit investigators, or claims examiners. A legal background is also a valuable asset to people seeking public office.

### **Where Employed**

Eighty percent of the approximately 240,000 lawyers listed by the American Bar Association as employed in 1960 were in private practice. Approximately 60 percent of the private prac-

tioners were in practice by themselves; about 30 percent were in partnerships; and the remainder—less than 10 percent—worked for other lawyers or law firms.

The greatest number of salaried attorneys are employed by government agencies. In 1960, the Federal Government employed approximately 13,000 attorneys, chiefly in the Department of Justice, the Department of Defense, and the Veterans Administration. About 8,000 attorneys held positions with city or county governments, and 4,000 were employed by State governments. Nearly 8,000 held judicial positions.

The second largest number of salaried lawyers are employed by private companies, including large manufacturing firms, banks, insurance companies, real estate firms, and public utilities. Most of the remainder teach in law schools. Some lawyers in salaried legal positions also have an independent practice; others do legal work on a part-time basis while primarily employed in another occupation.

Although lawyers practice in all parts of the country, most of them are in cities and in the States with the greatest population. In 1960, for example, nearly 30 percent of all lawyers were in New York City, Chicago, Washington, D.C., Los Angeles, Boston, Detroit, Philadelphia, and Cleveland. About half were located in the District of Columbia and the following six States: New York, California, Illinois, Ohio, Texas, and Pennsylvania.

### **Training, Other Qualifications, and Advancement**

Before a lawyer can practice in the courts of any State he must be admitted to the bar of that State. In all States applicants must pass a written examination; a few States waive this requirement, however, for graduates of their own in-State law schools. If a lawyer has been admitted to the bar in one State, he can usually be admitted to practice in another State without taking an examination, provided he meets the State's standards of good moral character and has a specified amount of legal experience. The right to practice before Federal courts and agencies is controlled by special rules of each court or agency.

To qualify for the bar examinations in most States, an applicant must have completed 2 or 3 years of college work and, in addition, must be a graduate of a law school approved by the American Bar Association or the proper State authorities. A few States permit graduates of correspondence law schools to take the bar examination, and some will accept study in a law office instead of, or in combination with, study in a law school—though this method of training is now rarely used. A number of States require registration and approval by the State Board of Examiners before students enter law school. In two States (New York and Pennsylvania), candidates must complete a period of clerkship in a law office after graduation from law school before they are admitted to the bar examination.

As a rule, it takes 6 years of full-time study after high school to complete the required college and law school work. The most usual preparation for becoming a lawyer is 3 years of college study followed by 3 years in law school. Law schools that have a 4-year, full-time curriculum may accept students after 2 years of college work. On the other hand, some law schools require applicants to have a college degree. Law schools seldom specify the college subjects which must be included in students' pre-legal education. However, courses in English, history, economics, and other social sciences, logic, and public speaking are all important for prospective lawyers. In general, their college background should be broad enough to give them an understanding of society and its institutions. Students interested in a particular aspect of the law may find it helpful to take related courses; for example, engineering and science courses would be useful to the prospective patent attorney, and accounting would be useful to the future tax lawyer.

Of the 158 law schools in existence in 1960, 132 were approved by the American Bar Association and the others—chiefly night schools—were approved by State authorities only. A substantial number of full-time law schools have night divisions designed to meet the needs of part-time students; some law schools have only night classes. Four years of part-time study is usually required to complete

the night-school curriculum. In 1960, more than one-third of all law students were enrolled in evening classes.

Although qualified young people interested in a legal career can usually obtain admission to a law school, they may not always be able to enroll in the school of their choice. Some of the better known schools have more applicants than they can accept. In selecting students, law schools consider college grades, amount of college education, the particular college attended, and recommendations made by college professors. A growing number of law schools require applicants to take the standard law school admission test, and several give their own aptitude tests.

The first 2 years of law school are generally devoted to fundamental courses such as contracts, criminal law, and property. In the third year, students may elect courses in specialized fields such as tax, labor, or corporation law. Practical experience is often obtained by participating in legal aid activities sponsored by the school, in the school's practice court where the students conduct trials under the supervision of experienced lawyers, and by writing on legal issues for the school's law journal. Upon graduation, the degree of bachelor of laws (LL.B.) is awarded by most schools, although a few confer the degree of juris doctor (J.D.) to graduates with high scholastic standing. Advanced study is often desirable for those planning to specialize in one branch of the law or to engage in research and law-school teaching.

Most beginning lawyers start in salaried positions, although some go into independent practice immediately after passing the bar examination. Young salaried attorneys usually act as assistants (law clerks) to experienced lawyers. Initially, their work is limited to research such as checking points of law; they rarely see a client or argue a case in court. After several years of progressively responsible salaried employment, during which time they can obtain experience and funds and become well known, many lawyers go into practice for themselves.

### Employment Outlook

Graduates from widely recognized law schools and those in the top 10 percent of their classes

will have favorable employment prospects through the mid-1960's. They are expected to have good opportunities for obtaining salaried positions with well-known law firms, on legal staffs of corporations and government agencies, and as law clerks to judges. Graduates of the less well-known schools and those who graduate with lower scholastic ratings are likely to experience some difficulty in finding salaried positions as lawyers. However, numerous opportunities will be available for law school graduates to enter a variety of salaried positions requiring a knowledge of law. Law graduates will also be in demand as commissioned officers in the Armed Forces who are assigned to legal positions. Young attorneys who open their own law offices after being admitted to the bar will, as in most other independent professions, generally face a period of low earnings while they build up their practice.

Prospects for establishing a new practice will probably continue to be best in small towns and expanding suburban areas. In such communities, competition with other lawyers is likely to be less than in big cities; also, office rent and other business costs may be somewhat lower, and young lawyers may find it easier to become known to potential clients. On the other hand, opportunities for salaried employment will be limited largely to big cities where the chief employers of legal talent—government agencies, law firms, and big corporations—are concentrated. For able and well-qualified lawyers, good opportunities to advance will be available in both salaried employment and private practice.

Although the majority of employment opportunities for new lawyers will continue to arise from the need to replace those who retire, die, or otherwise leave the field, a gradual increase in the legal profession is expected over the long run. Most of the growth will result from the continuing expansion of business activity and population. In addition, the increased use of legal services by low- and middle-income groups will add to the long-term growth in demand for lawyers. The growing complexity of business and government activities is expected to create a steadily expanding demand for lawyers who are specialists in such fields as corporation, patent, administrative, labor, and international law.

Opportunities for women lawyers, who comprised less than 3 percent of the profession in 1960, will probably continue to be limited for some time to come. Although more than half of all women lawyers are employed in salaried positions, a substantial number are in practice for themselves. Many women lawyers hold positions, not as attorneys, but in occupations requiring a knowledge of law.

### **Earnings and Working Conditions**

In the Federal Government, the annual starting salary for attorneys who had passed the bar was either \$5,355 or \$6,435 in early 1960, depending on the applicant's qualifications. Attorneys employed in beginning salaried positions with manufacturing and other business firms had an average salary of approximately \$6,000 a year in early 1960.

Beginning salaries for young lawyers are generally highest in large law firms and Federal agencies. Those working for small law offices or engaged in legal-aid work usually receive the lowest salaries. The beginning lawyer in practice for himself may make little more than his expenses during the first few years and may add to his total income by engaging in other part-time employment.

Lawyers' earnings usually rise with increased experience. Those employed on a salaried basis receive increases as they demonstrate their ability to assume greater responsibilities. Incomes of lawyers in private practice usually grow as their practices develop. Private practitioners who are partners in law firms generally have greater average incomes than those who practice alone.

Lawyers often work long hours and under considerable pressure when a case is being tried. In addition, they must keep abreast of the latest laws and court decisions. However, since lawyers in private practice are able to determine their own hours and workload, many stay in practice until well past 70 years of age.

### **Where To Go for More Information**

The specific requirements for admission to the bar in a particular State may be obtained from the clerk of the Supreme Court or the secretary of the Board of Examiners at the State capital. Information on law schools and on law as a career is available from:

The American Bar Association,  
1155 East 60th St., Chicago 37, Ill.

## **Librarians \***

(D.O.T. 0-23.20)

### **Nature of Work**

A library is an information center in which books, pamphlets, manuscripts, periodicals, clippings, and reports are housed and made available to readers. Many libraries also include phonograph records, maps, slides, pictures, tapes, films, and film strips. Librarians select, purchase, and maintain these materials and assist the public in their use. They classify and catalog books and other loan items, publicize library services, study the reading interests of people served by the library, do research to secure information requested, and provide reference service to various groups of readers.

Librarians may also collect, review, and abstract published and unpublished materials to prepare bibliographies and book reviews. Some advise schools or business organizations on sources of information for research. Others provide library services for community projects.

In a small library, a librarian may perform a great variety of tasks. In a large organization, a librarian may perform only a single function or may specialize in a subject-matter area, such as science, business, the arts, or medicine.

Librarians may be classified by the type of library where they are employed: public libraries, school libraries, college and university libraries, and special libraries. In each of these four types of libraries there are two principal

\* Prepared by the Women's Bureau, U.S. Department of Labor.





*Librarian providing reference materials to a student.*

kinds of library work—reader services and technical services. Reference librarians, children's librarians, and others who perform reader services work closely with the public. Librarians who perform technical services, including those who process books, such as catalogers or order librarians, are often remote from public contacts.

*Public Librarians.* These librarians, unlike those whose services are limited to readers with particular interests, serve all kinds of readers—children, adults, students, teachers, research workers, and others. The professional staff of a large public library system may include a chief librarian, an assistant chief, and several division heads, such as head of children's services or adult services. Persons in these positions plan and coordinate the work of the entire library system. Each branch library has a head librarian and several professional assistants. Each member of the professional staff may perform a specialized service. The duties of some of these specialists are described below.

An *order librarian* purchases books and other library materials selected by staff members; keeps a well-balanced library in quantity and quality, within budget limitations; makes sure that the library receives what it orders; and maintains close contact with book jobbers and publishers.

A *cataloger* organizes library materials. One

important duty is to maintain an accurate and up-to-date card catalog; another is to classify books under various subjects according to the particular system used.

A *reference librarian* works directly with the public, and aids them in their search for reference materials. This work requires a thorough understanding of bibliographic material and a general knowledge of library materials in various subject fields.

A *children's librarian* plans and directs a special program for children of various age groups. Some of the duties include selecting and evaluating new books, instructing children in the use and content of the library, selecting books for display, talking with members of the community interested in children, giving talks on books, and maintaining contact with schools. The children's librarian often conducts a regular story hour at the library and sometimes has a story hour on radio or television.

An *adult services librarian* may act as the liaison between the library and the public and render services to both young and older adults. By anticipating their readers' needs and interests, these librarians attempt to provide them with appropriate materials. They are often called upon to plan and conduct educational programs on such topics as community development, public affairs, creative arts, human relations, problems of the aging, or home and family life.

A *young adult services librarian* may select books and materials for young people, and guide them in the use of these materials. She may arrange book discussion groups, hours for listening to recordings of popular and classical music, and other programs related to young adult interests.

A *bookmobile librarian* brings the library to the people by means of a truck equipped with shelving and various library materials. These "extension-service" librarians work toward setting up library facilities where they are nonexistent and improving library services where they are inadequate. They may serve the needs of urban as well as rural residents where there is no permanent library. The bookmobile librarian must select the 1,500 to 3,000 volumes carried in the vehicle and advise both adults

and children in their reading selections. The bookmobile staff may include several professional librarians, a clerical helper, and the driver, but in some cases one person serves in all these capacities.

*School Librarians.* These librarians work with parents and teachers as well as with students, may operate one school library or several libraries within a school system, and may teach one or more classes. Their duties may include preparing supplementary reading lists in certain subjects; instructing students in the content and use of the library; setting up library exhibits; meeting with faculty members to discuss school programs; supervising and training student library assistants; and selecting, ordering, classifying, and cataloging library materials.

*College and University Librarians.* In higher institutions, these librarians work with students, faculty members, and research workers, in general reference or in a particular field of interest, such as law, economics, or music. In addition, the college librarian may teach one or more classes in the use of library facilities.

*Special Librarians.* These librarians are employed by all types of trade and service establishments, industrial organizations, museums, government agencies, research laboratories, labor unions, hospitals, and other groups. Many of these libraries are small, both in terms of staff and book collections, but they often contain a wide selection of periodicals, newspaper clippings, technical reports, maps, pamphlets, patents, slides, and the like. The special librarian's main responsibility is to obtain material the library's clientele is most likely to need and to keep them up to date on new material pertinent to their interests. The value of such a library depends to a large extent on the librarian's skill, knowledge, and initiative. Therefore, this librarian needs special competence in the subjects of interest to the employer.

### Where Employed

Librarians are employed in public libraries (municipal, county, and State) and in libraries

maintained by public and private schools, colleges and universities, government agencies, educational and research associations, medical institutions, and business and industrial firms. Some librarians work as teachers and administrators in schools of library science. Approximately 85 percent of all librarians are women, and most of them are employed in public libraries or in the libraries of public schools.

Over the past decade, nearly one-third of the graduates of accredited library schools were placed in public libraries and almost one-third in college and university libraries, according to a survey made in 1959 and published in the *Library Journal* for June 15, 1960. Public school libraries employed about one-fifth of these graduates, and special libraries employed the remainder.

Nearly 25 percent of the graduates who earned a bachelor's, master's or Ph. D. degree in library science in 1959 were men. More men have entered this field in recent years because of higher salaries, the need for more librarians in such fields as science and technology, and improved opportunities for advancement to administrative positions due to the growing size and complexity of individual library systems.

An estimate based on data from a number of sources indicates that about 64,000 librarians were employed in 1960. Approximately 45 percent were employed in school libraries, about 30 percent in public libraries, nearly 15 percent in colleges and universities, and the remainder in special libraries and in government agencies.

Most librarians work in cities and towns. Others, attached to bookmobile units, serve widely scattered population groups, mostly in suburban or rural areas. More than 1,000 bookmobiles were in use in 1960.

### Training, Other Qualifications, and Advancement

To qualify as a professional librarian, one must have completed a course of study in an accredited library school. This ordinarily means 5 years of college—4 to meet requirements for a bachelor's degree and a fifth year or more

of specialized study in library science, after which the master's degree is conferred. A growing proportion of the persons in administrative and other high-level library positions have such training.

A Ph.D. degree is a real advantage to persons who plan a teaching career in library schools or who aspire to a top administrative post in a college or university library. In some instances, this degree is a requisite for such jobs.

A graduate school which confers the master's degree in library science is called a library school. Entrance requirements commonly include: (1) graduation from an accredited 4-year college or university, (2) a good undergraduate record, and (3) a reading knowledge of a foreign language. Most library schools emphasize the importance of a liberal arts undergraduate program with a major in the social sciences, physical and biological sciences, the arts, or comparative literature. Certain schools allow credit for introductory undergraduate courses in library science; others do not. Skill in typing is regarded as a useful tool for library students.

Graduate programs generally concentrate on the principles of librarianship, the organization and administration of libraries, and the history and function of libraries in society. A student is allowed considerable latitude in the fulfillment of course requirements, but he ordinarily specializes in one major area of librarianship, such as the administration of public libraries, school libraries, or college libraries; history of books and libraries; or the use of audio-visual media in the library.

Certain positions for special librarians require completion of courses in the subject matter with which the librarian will work. A business librarian, for example, might study economics, accounting, business management, and finance.

To complete work for the master's degree in library science, most schools require either two full semesters and one summer session or three full semesters. In 1960, there were 32 graduate schools in the United States and Canada which were accredited by the American Library Association.

Some scholarships for training in library

science are available from State and Federal funds made available under the terms of the Library Services Act passed by Congress in 1956. This Act provides Federal funds for the extension and improvement of rural public library service, and calls for State and local participation. Library schools offer scholarships, and persons interested in library science are usually eligible to compete for general scholarships offered by many colleges and universities.

Some students attend library schools under cooperative work-study programs, combining their academic program with practical work experience in a library. In order to aid the student in arranging his work-study schedules, many schools have adopted the policy of offering all courses every semester.

School librarians must be certified in all States and must also be certified as teachers in all States except one. Therefore, in addition to a general liberal arts program, persons who wish to become school librarians must take courses in professional education as well as in librarianship. Since the number of semester hours required in education courses varies from State to State, information on this topic should be secured from the certifying officer in the appropriate State department of education.

At least 24 States require certification of public librarians; in 5 of them, librarians in colleges and universities must also be certified. Other requirements, based on different combinations of education and experience, are sometimes established by local, county, or State authorities. Information on the requirements governing certification of librarians can be obtained from the American Library Association.

In addition to an appropriate educational background, a person interested in the field of librarianship should have above-average intelligence, an attraction to books, an interest in people, intellectual curiosity, an ability to express himself clearly through the written and spoken word, a desire to search for and use recorded materials, and an ability to work harmoniously with others.

Advancement for the librarian may come by obtaining a higher grade position in the same library or in another library. Promotion to

administrative positions or to specialized work is also possible on the basis of additional library training or experience. For example, over one-half of all State departments of education utilize school library supervisors who direct in-service training, provide consultative services on library development, and work with curriculum supervisors to improve instruction. Advancement to these higher positions may be limited, however, to "professional librarians" who have completed graduate training in an accredited library school or to those who have had specialized training and experience.

### Employment Outlook

The employment outlook for trained librarians is expected to be excellent during the 1960's. The nationwide shortage of trained librarians reported by library schools, associations, and the U.S. Office of Education in 1960 is expected to grow worse during the decade, partly as a result of the overall population increase in the United States and the passage of the Library Services Act of 1956 with its subsequent extension to 1966. Improved standards for school and college libraries and the expanding school and college population will also necessitate the employment of a growing number of fully trained librarians. Many additional openings will be created by turnover among young women in the field who leave their jobs for marriage and other reasons. By 1970, as many as 80,000 trained librarians may be needed.

Since there is a shortage of fully trained librarians, many positions will continue to be available for persons who have only a bachelor's degree with a major in library science. Some positions will also be open to college graduates who have had little or no library training.

The number of degrees granted in library science has remained relatively constant for some time (averaging about 1,900 a year), despite the rising number of job openings. Job opportunities exist in all parts of the country and in all types of libraries. For those who like to travel, have had considerable experience in special library work, and are competent in public affairs, there are opportunities in American libraries overseas, such as those run by

the United States Information Agency and the Armed Forces. Among the greatest shortage areas are cataloging, children's work, and special library services in science and technology. Graduates of some of the larger schools are currently being offered from 10 to 20 different jobs; a number of schools have as many as 40 requests for each graduate.

Part-time positions will be available at an increasing rate for trained persons interested in library work. Approximately 4,000 librarians are now working part time in public libraries. Older workers trained in librarianship may find shortrun work as library consultants, as substitutes during vacations, or may help in setting up new libraries. Some semi-professional work is also available for college students or other persons interested in gaining library experience before deciding upon a career in this field.

### Earnings and Working Conditions

Starting salaries of library school graduates generally range from \$4,400 to \$5,000 yearly. Specialists with extensive experience can earn up to \$12,000 annually; a few may go as high as \$20,000. In 1959, the average annual salary of new graduates with a master's degree from an accredited library school was \$4,862. Geographical location, size of city, size and type of library, and degree of responsibility and technical skill required are important factors influencing librarians' salaries.

In the Federal Government, the entrance salary for librarians was \$4,345 or \$5,355 in 1960, depending on the extent of education and experience. A number of supervisory positions offered salaries up to \$10,000 and a few as high as \$15,000. The average salary for professional librarians in 1959 was \$6,545.

The average salary for all special librarians was about \$6,100, according to a 1959 survey by the Special Libraries Association. Special librarians with 2 years or less experience had an average salary of \$5,100. Top salaries were over \$10,000. An analysis of librarians' salaries by type of organization or business showed that the highest salaries were in the fields of nuclear

and atomic energy, petroleum, aircraft, and chemicals.

School librarians are usually on the same pay scale as teachers, with the salary determined by the amount of education and experience. In schools employing more than one librarian, the head librarian usually has the rank of department head.

The typical workweek for librarians is 5 days and from 35 to 40 hours. The work schedule of public and college librarians may include some Saturday, Sunday, and evening work. School librarians generally have the same workday as classroom teachers. A 40-hour week during normal business hours is common for government and special librarians.

The usual paid vacation after a year's service is 3 to 4 weeks. Vacations may be longer in school libraries and somewhat shorter in those operated by business and industry. In addition to paid vacations, most librarians receive several paid holidays each year. Many

librarians are covered by sick leave; life, health, and accident insurance; and pension plans.

#### **Where To Go for More Information**

Additional information, particularly on accredited schools, requirements for librarianship, and scholarships or loans, may be obtained from:

American Library Association,  
50 East Huron St., Chicago 11, Ill.

Information on requirements and placement of special librarians may be secured from:

Special Libraries Association,  
31 East 10th St., New York 3, N.Y.

Information about library services may be secured from:

Office of Education, Library Services Branch, U.S.  
Department of Health, Education, and Welfare,  
Washington 25, D.C.

Individual State library boards can furnish information on scholarships available through their offices and on requirements for certification.

## **Newspaper Reporters**

(D.O.T. 0-06.71)

### **Nature of Work**

Reporters gather information and write news stories for publication in daily or weekly newspapers. They interview people, review police and public records, observe events as they happen, and do research in libraries and other places. As a rule, reporters take brief notes while collecting facts and write their stories upon return to the office. Sometimes, to meet deadlines, they telephone their stories to "dictationists" or give the information by phone to other staff members known as "rewrite men," who write the stories for them.

Large dailies frequently assign some reporters to "beats," such as police stations or courts, to cover news originating in these places, whereas other local news is handled by general assignment reporters. News on certain subjects, such as sports, politics, and religion, is often dealt with by specialists in these fields. Reporters on small newspapers often get broader experience; they not only cover all aspects of

local news but may also take photographs, write headlines, lay out inside pages, and even write editorials. On the smallest weeklies, they may also solicit advertisements, sell subscriptions, and perform general office work.

Newspaper reporting is only one of several occupations open to young people trained in journalism. Persons with this background may also work for magazines, trade, business and labor publications, and other periodicals; for radio and television stations, advertising agencies, and public relations firms; and for government agencies. These related activities are not covered in this statement.

### **Where Employed**

About 25,000-30,000 newspaper reporters were employed in the United States in 1960. The majority worked for daily newspapers; most of the others worked for weekly papers. In addition, some reporters were employed by



*Reporters in the city room preparing news stories.*

press services and newspaper syndicates.

Reporters work in cities and towns of all sizes throughout the country. Of the approximately 1,800 daily and 9,000 weekly newspapers, the great majority are in medium-sized towns, often in the suburbs of large cities. Large numbers of reporters, however, are in cities, since big city dailies employ many reporters, whereas a small-town paper generally employs only a few.

### **Training, Other Qualifications, and Advancement**

Although talented writers with little or no academic training beyond high school sometimes become reporters, an increasing number of newspapers will consider only applicants with a college education. Some editors prefer those with a degree in journalism; others consider a degree in liberal arts equally desirable.

Professional training leading to a bachelor's degree in journalism can be obtained in more than 150 colleges; about 100 of these have separate departments or schools of journalism. The typical undergraduate journalism curriculum is offered during the junior and senior years of college and is divided about equally between cultural and professional subjects. Students preparing to become newspaper reporters take professional subjects such as re-

porting, copyreading, editing, feature writing, and the history of journalism. A number of schools also award the master's degree in journalism, but only a few offer programs leading to the doctor's degree in this field. Most schools and departments of journalism are not overcrowded, and qualified applicants have an excellent chance of admittance.

Young people who wish to prepare for newspaper work through a liberal arts course should take English and specialized courses in writing, as well as such subjects as sociology, political science, economics, history, and psychology. Those without college training usually qualify by gaining experience on rural, small-town, or suburban papers.

Writing ability is fundamental to success in this field. Other personal characteristics of importance are a "nose for news," persistence, initiative, resourcefulness, an accurate memory, and the physical stamina necessary for an active and often fast-paced life. Skill in typing is useful since reporters often type their own news stories. In beginning jobs on small papers, a knowledge of news photography is also valuable.

Many beginners start on weekly or small daily newspapers. Some outstanding college graduates, however, are hired directly for reporting positions by papers that prefer to train them on-the-job. Others, also usually college graduates, start on large city papers as copy boys, acting as messengers or office boys. They may be promoted to reporting jobs as they gain experience and as openings arise.

In competing for regular positions, it is helpful to have had experience as a "stringer"—one who covers the news in a particular area of the community for a newspaper and is paid on the basis of the stories printed. Experience on a high school or college newspaper may also be helpful in obtaining employment.

Beginning reporters are first assigned to such work as summarizing speeches, covering civic and club meetings, writing obituaries, interviewing visitors to the community, and covering police court proceedings and minor news events. As they gain experience, they may advance to covering more important developments or to a "beat" or special subject.

Reporters with extensive experience may become rewrite men or copy editors. Newspapermen also progress to reporting jobs with larger papers or with press services and newspaper syndicates. Some experienced reporters advance to positions such as columnists, correspondent, editor, or to top executive positions or become publishers, but these positions represent the top of the field and competition for them is keen. Other reporters transfer to related fields such as advertising, radio, television, or public relations.

### **Employment Outlook**

Well-qualified beginners with writing talent will have good employment opportunities through the mid-1960's. In 1961, newspaper editors were actively seeking more young reporters with exceptional talent. People with only average ability, however, were facing keen competition for jobs, especially on large city dailies, and will probably continue to do so.

Weekly or daily newspapers located in small towns and suburban areas will continue to offer the most opportunities for beginners to enter newspaper reporting. Openings continually arise on these papers as young people gain experience and transfer to reporting jobs on larger newspapers or to other types of work. Moreover, the number of newspapers in suburban areas is increasing, and many of the existing ones are expanding their staffs to satisfy the need for more detailed community news. Preference in employment on small papers is likely to be given to beginning reporters who are able to help with photography and other specialized aspects of newspaper work and who are acquainted with the community.

Large city dailies will also provide openings for inexperienced people with a good educational background as well as a flair for writing to enter as reporter trainees, and a number of opportunities will continue to be available for young people to enter as copy boys and advance to reporting jobs.

In addition to jobs in newspaper reporting, new college graduates with journalism training will find numerous openings in related fields, such as advertising, public relations, trade and

technical publishing, radio, and television. The broad field of mass communication, which has grown rapidly in recent years, will continue to expand in the 1960 decade. Factors pointing toward continuing expansion include rising levels of education and income; increasing expenditures for newspaper, radio, and television advertising; a growing number of trade and technical journals and various types of company publications. Newspapers will share in this growth. Employment of reporters is expected to increase, although not as fast as employment in some related areas. The greatest number of job openings will continue to arise from the need to replace reporters who are promoted to editorial or other positions, transfer to other fields of work, retire, or leave the profession for other reasons.

Special opportunities for women will continue to be found in reporting on such subjects as society news, food, fashions, clubs, and beauty culture for the women's section of newspapers. Many women reporters, however, have the same types of job assignments as men.

### **Earnings and Working Conditions**

Many daily newspapers have negotiated contracts with the American Newspaper Guild which set minimum wages based on experience and provide for annual salary increases. Papers with Guild contracts, however, often pay salaries higher than the minimum rates called for in their contracts. Particularly successful, experienced reporters on city dailies may earn more than \$200 a week. In mid-1960, the minimum starting salaries on most daily newspapers with Guild contracts ranged from \$55 to \$90 a week for reporters with no previous experience. On a few small dailies, the Guild minimum starting salaries were less than \$55 a week; on a few large dailies Guild minimum rates for beginning reporters ranged between \$85 and \$100 a week. Young people starting as copy boys earn less than new reporters—minimum Guild rates for copy boys with some experience ranged from about \$40 to slightly more than \$75 a week.

On most dailies, minimum Guild rates for reporters with some experience (usually for

those with 4 to 7 years) ranged from about \$108 to \$150 a week in mid-1960. Contract minimums for experienced reporters on a few small dailies were less than \$100 a week; on a few large dailies they were more than \$150 a week.

According to a private survey, based primarily on large city papers, the average income of reporters with at least 6 years of experience was \$7,075 a year in 1960: average yearly earnings were \$8,705 on papers with a circulation of over 150,000; \$6,256 on papers with a circulation between 50,000 and 150,000; and \$5,999 on those papers with a circulation of less than 50,000.

Newspaper reporters on big city papers frequently work 7½ hours a day, 5 days a week; other reporters generally work an 8-hour day, 40-hour week. Many of those employed by morning papers start work in the afternoon and finish about midnight. City papers pay overtime rates for work performed after the regularly scheduled workday or for more than 40 hours of work a week; they often provide

various employee benefits such as paid vacations, group insurance, and pensions.

### Where To Go for More Information

Information about opportunities with daily newspapers may be obtained from:

American Newspaper Publishers Association,  
750 Third Ave., New York 17, N.Y.

Information on opportunities in the newspaper field may be obtained from:

The Newspaper Fund, Inc.,  
44 Broad St., New York 4, N.Y.

Information on union wage rates is available from:

American Newspaper Guild, Research Department,  
1126 16th St. NW., Washington 6, D.C.

Names and locations of all daily newspapers and a list of departments and schools of journalism are published in the Editor & Publisher International Yearbook, available in most large newspaper offices and public libraries.

## Photographers

(D.O.T. 0-56.01 through .31)

### Nature of Work

Photography is both an artistic and a technical occupation, involving much more than taking clear pictures of people and views. Some photographers produce pictures which are so beautifully composed, otherwise artistic, and striking that they are recognized as works of fine art. Skillful portrait photographers take pictures which are not only natural looking and attractive, but express the personality of the individual. In taking pictures for advertising and other commercial purposes, the photographer has to understand how the picture is to be used and plan to take it in such a way as to achieve the desired effect. Photographing sports and other news events also calls for special photographic skills, as to other branches of photographic work.

In taking pictures, photographers use a variety of cameras—miniature (35 mm.), still, motion picture, and others. The cameras may

be equipped with telescopic, wide-angle, or other special lenses and with different types of light filters, to enable the photographer to get the particular effects desired in each picture. Photographers also utilize many kinds of film and must know which to use for each type of picture, different lighting conditions, cameras, and filters. When taking pictures indoors or after dark, they use lighting equipment—flash bulbs for some pictures, flood and other special lights and reflectors for others. In addition, photographers must understand and be able to carry through the chemical and other processing by which pictures are developed, enlarged, and printed. In small shops and photographic departments, the photographer often has to do all this technical work. This may be required also in large studios, but, as a rule, such studios employ photographic technicians to do the needed technical work. The techniques involved in taking motion pictures





Photograph by U.S. Department of Labor

*Photographers carefully pose models for effective pictures.*

differ greatly from those used in still photography and, therefore, most photographers work in only one field.

Professional photographers may either specialize in one kind of work or engage in almost all kinds of photography. The most common photographic specialties are portrait work, commercial photography, and industrial photography. Portrait photographers work mostly in their own studios, though they sometimes go to people's homes or other places to take pictures. Commercial photographers generally take pictures for use in advertising real estate, furniture, food, apparel, and other items, but they may also do other kinds of photographic work. Industrial photographers work for a single firm or company, mainly taking pictures that are used in company publications and for advertising company products or services. They may take motion pictures of workers on the job and of equipment and machinery operating at high speed to simplify work methods or to improve the production process. Other photographic specialties include press photography (combining a "nose for news" with photographic ability); aerial photography; educational photography (preparing slides, film strips, and movies for use in the classroom); and scientific photog-

raphy, taking pictures for use in scientific research or technical journals. In addition, some photographers write for trade and technical publications, teach photography in schools and colleges, act as representatives of photographic equipment manufacturers, manage photofinishing establishments, sell photographic equipment and supplies, produce documentary films, or do freelance work.

### Where Employed

About 60,000 photographers were employed in mid-1960. Roughly half of them worked in portrait or commercial studios—many in business for themselves, the rest as salaried employees. In addition, sizable numbers were employed in industry; some worked for Federal, State, and local government agencies; and others operated camera stores or worked on the staffs of newspapers and magazines. Still others worked as freelance photographers, taking pictures of many kinds and selling them to advertisers, magazines, and other customers.

Photographers work in all parts of the country, in small towns as well as large cities. They are, however, mainly concentrated in States which are heavily populated—New York, Pennsylvania, California, Ohio, and Illinois—and which also have great numbers of businesses and industrial establishments.

### Training, Other Qualifications, and Advancement

After graduating from high school, young people may prepare for work as professional photographers through 2 or 3 years of on-the-job training in a portrait or commercial studio. A trainee generally starts by working in the darkroom, where he learns how to develop and print film and to do other related work such as making enlargements. Later, the trainee may set up lights and cameras or otherwise assist an experienced photographer in taking pictures. Photographic training can also be obtained in many colleges and universities, trade schools, and technical institutes, or by taking correspondence school courses. Several colleges and universities offer 4-year curriculums leading to a bachelor's degree with a major in photog-

raphy. These curriculums include liberal arts courses as well as courses in professional photography. A few institutions have 2-year curriculums leading to a certificate or an associate degree in photography.

The kind and amount of training obtained greatly influence the kind of photographic work for which a young person can qualify. For example, considerable formal training, plus some photographic experience, is usually needed to enter the fields of industrial, news, or scientific photography. Amateur photographic experience may be helpful to the young person considering a career in this field.

The prospective photographer should have manual dexterity and some artistic ability. In addition, a pleasant personality, the ability to put people at ease, and a good business sense are needed by photographers who expect to go into business for themselves. Imagination and originality are particularly important for those aspiring to careers in commercial photography or freelance work. For news or press photography, a knowledge of news values and the ability to act quickly are important.

Beginning photographers often work in established studios until they accumulate the capital and experience needed to start their own businesses, although some open their own portrait or commercial studios immediately after completing their training.

### Employment Outlook

Employment opportunities are expected to be favorable through the mid-1960's for talented and well-trained photographers. Such photographers should find work readily in most parts of the country. People with less ability and training are likely to encounter keen competition and also to have limited chances of advancement.

The portrait and commercial fields of photography were crowded in 1960, and this situation is likely to persist. These fields may be easily entered, since a photographer can go into business for himself without a large financial investment. Moreover, the available supply of portrait and commercial photographers is continually enlarged by people who are employed

in other occupations but who take pictures in their spare time. Less competition is likely in industrial photography and other fields which require a thorough knowledge of photography as well as other technical or scientific training.

Over the long run, a moderate increase in employment of photographers is expected, with the growth in population. The movement of families to the suburbs will create some opportunities for photographers to open portrait studios in the new shopping centers. Other factors which point toward an increase in the employment of photographers are the increasing use of photographs in advertising, the expected growth in the number of film strips and motion pictures produced for use of business and industry, civic organizations, and government; and continued research and development in the missiles field. Since a large part of this work will be done by people on the staff of manufacturing firms, employment of industrial photographers is likely to rise at a more rapid rate than that of either portrait or commercial photographers. Nevertheless, as in the past, it is likely that the greatest number of job openings will continue to be in the much larger fields of portrait and commercial photography because of the need to replace those photographers who transfer to other fields of work, retire, or die.

### Earnings and Working Conditions

Beginning photographers generally earned from \$60 to \$80 a week in mid-1960, according to limited information from various private sources. Many photographers with established reputations earned much more. For newspaper photographers without previous experience and employed on daily newspapers having contracts with the American Newspaper Guild, minimum salaries were usually between \$50 and \$80 weekly. Minimum rates for photographers with some experience (usually 4 to 6 years) ranged from \$105 to \$150 a week on most dailies organized by the Guild. The entrance salary for inexperienced photographers in the Federal Civil Service was \$3,500 a year; for those with at least 1 year of routine photographic experience, it was \$3,760 a year. In

addition, the salary schedule provides for periodic increases above this amount. Most experienced photographers in the Federal Government earn \$4,345 or more a year; only a few earn over \$10,000 annually. Self-employed photographers generally earn more than salaried workers, but their earnings are greatly affected by business conditions, their work-week, and many other factors.

Photographers with salaried jobs usually work the standard 5-day, 40-hour week and receive benefits such as paid holidays, vacations, and sick leave. Photographers in busi-

ness for themselves frequently work longer hours, especially during their busy seasons. Working conditions are generally pleasant. Freelance, press, and commercial photographers may be required to travel frequently.

### Where To Go for More Information

Information about photography as a career, as well as a list of schools of photography, is available from:

Professional Photographers of America, Inc.,  
152 West Wisconsin Ave., Milwaukee 3, Wis.

## Programmers

(D.O.T. 0-69.981)

### Nature of Work

The occupation of programmer is one of the very newest—as new as the electronic computer. Computers, even though sometimes called “mechanical brains,” can only follow carefully prepared instructions about what they are to do on each job. It is the programmer who prepares these step-by-step instructions.

A computer not only makes mathematical calculations at the fantastic speeds of electronic impulses, but it has a “memory” in which many thousands of facts can be stored and later used by the machine in carrying out its work. Because of their enormous speed and other capacities, computers can take over a great deal of work (or “data-processing”) which might otherwise require the time of many employees. They handle such varied assignments as making up payrolls, regulating automatic production lines in factories, and controlling the movement of trains. They have been used for work which otherwise would not be attempted on the same scale because of the time involved—analyzing masses of information about operating costs and potential markets, for example, in order to enable business firms to decide on the most advantageous location for a new plant; and they have accomplished things that would otherwise be impossible—such as controlling the flight of a missile by instantaneously correcting deviations from the planned course. Still other “problems” for

which computers have been used include studying the structure of chemical compounds, analyzing radioactive fallout, doing legal research, and translating books into Braille for the blind.

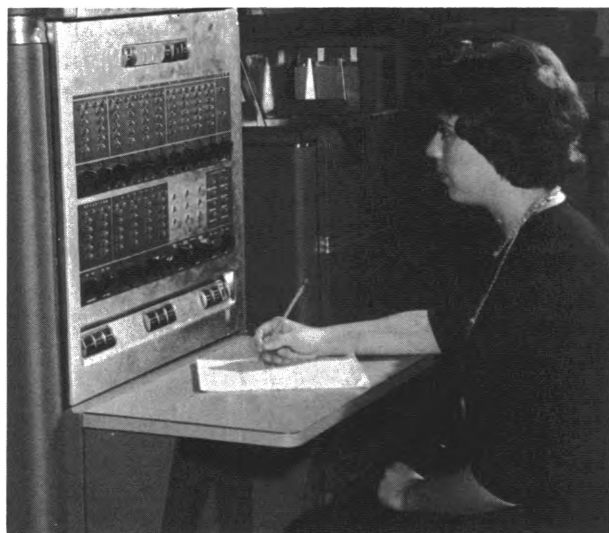
Every problem that is processed on a computer must first be carefully analyzed so that plans can be made for processing the data in the most efficient manner. There are usually several possible ways of obtaining the correct answer to any given problem, some of them more direct than others; and there are often valuable “byproducts” of information which can be produced by the computer in the course of solving a problem. In many offices, a programmer does this preliminary analysis and planning; in other offices, this work is done instead by specialists known as methods analysts, project planners, or systems analysts.

Once the general plans have been completed, the programmer is ready to start his job of writing the “program,” or detailed plan for processing the data on the computer. Exactly how he does this depends a good deal on the kind of computer used and the nature of the problem being programmed. The mathematical calculations involved in preparing a payroll, for example, are very different from those required in most kinds of scientific and technical work and the programming techniques are also very different. Furthermore, special techniques such as “linear programming” and numerical anal-

ysis may be called for in working out solutions to some kinds of business and scientific problems. For these reasons, most programmers specialize in specific types of problems.

Regardless of the nature of the problem, the programmer usually starts his job by conferring with professional staff members and other officials in his organization who are in a position to furnish him with detailed information about the subject matter of the problem. If the computer is to be used to make up a payroll, for example, he first determines which facts must be used in order to produce each employee's paycheck and he finds out the exact form in which these facts—wage rates, hours worked, and other payroll information—are entered on the company's records. This done, he makes a flow chart, or diagram, showing the order in which the computer must perform each operation, and for each operation he prepares detailed instructions, or "routines." These routines, once they have been transferred to the computer's memory, tell the machine exactly what to do with all of the facts and figures associated with the problem. Usually the routines must be translated into a sort of code—the machine language to which the computer can respond—and often the coding is done by the programmer. He is also responsible for making a detailed record of the reasoning he has followed in developing each routine, and for preparing an instruction sheet for the console operator to follow when the program is run on the computer. (The work of the console operator is described in the chapter on Clerical and Related Occupations. See index for page number.)

The final step in programming is "debugging"—that is, checking on whether the instructions have been correctly written and will produce the desired information. This may take only a little time or, if trouble spots develop, become a tedious and long-drawn-out process. A program is usually debugged in two steps. First, the programmer takes a sample of the data to be processed and reviews step by step just what will happen as the computer follows the series of instructions which make up the program. Then, after he has revised the instructions to take care of any difficulties that arise,



Photograph by U.S. Department of Labor

*Programmer using a computer console to "debug" a program.*

he tests out the "trial routine" on the computer. Sometimes the console operator helps with this part of the debugging process. If all goes well, the computer will produce a solution to the trial routine which is identical with a solution worked out by other means. If the two answers are not the same, or if the computer simply stops running midway through the trial routine (as may happen if a situation arises which is not provided for in the program), it is the programmer's job to locate any further sources of trouble and make the necessary program changes.

A comparatively simple problem can be programmed for a computer within a few hours. A program which deals with a complex problem or is designed to produce many different kinds of information may require thousands of routines and a year or more of preparation. On involved problems, several programmers at different levels of responsibility often work as a team, under the supervision of a senior programmer.

### Where Employed

No exact figures are available on the number of programmers. Industry spokesmen estimated the total employed full time in this work in

early 1961 at around 40,000. In addition, a great many workers spend part of their time in programming. A considerable number of these are engineers, scientists, economists, accountants, and other professional workers, whose programming duties are incidental to other major job responsibilities.

Programmers are employed chiefly in metropolitan centers where the offices of large business organizations and Government agencies are located. A great many work for insurance companies, public utilities, wholesale and retail establishments, and large manufacturing firms of almost every kind. A considerably smaller number are Government employees doing work related either to scientific and technical problems or to the processing of the vast amount of paperwork which must be handled in many government offices. In addition, a growing number of programmers are employed in service centers which furnish computer and programming services to business firms and other organizations on a fee basis.

#### **Training, Other Qualifications, and Advancement**

Most programmers are chosen for their jobs because they are judged to have an aptitude for the work and have had training or experience related to the problems to be programmed. As a rule, they learn the programming techniques they will need only after they are hired for this work. The special abilities most sought after are similar in all kinds of programming, but requirements with respect to education and experience may be very different, depending on the nature of the problems with which the programmer will be dealing. For example, some people in this occupation are college graduates with degrees in engineering, whereas others have had years of experience in such work as accounting or inventory control.

Young people interested in programming jobs can begin to acquire the necessary skills by taking courses in programming techniques and the logic of computers now offered in a small but steadily increasing number of colleges and universities. Many other colleges give helpful courses in the general field of electronic data processing, and a few city high schools are ex-

perimenting with courses in computer programming which are open to small groups of students. It is likely that training programs such as these will be extended and improved as greater use is made of computers in the future. However, the courses so far available by no means eliminate the need for on-the-job training. Since technological changes are continually taking place in this field and each type of computer has its own special programming requirements, such training is usually necessary even in the case of experienced "oldtimers" who change from one job to another.

In selecting programmers, employers look for people with an aptitude for the exacting kind of analysis which is part of the job. Prospective programmers are often required to take special tests which indicate whether they possess the high degree of reasoning ability required. In addition, programmers should have a great deal of patience and persistence and be able to work with extreme accuracy, follow instructions carefully, and express themselves clearly in writing and orally. Ingenuity and imagination are very desirable traits, since programmers often have to work out new ways of arriving at solutions to problems.

Most organizations which use their computers for scientific and engineering work also require that their programmers be college graduates. The technical knowledge needed for some of this work is such that employers take people with the necessary academic background and then train them in programming, in preference to hiring experienced programmers who have no knowledge of science or engineering. Graduate degrees may be required for some positions; for practically all positions, an applicant who has no college training at all is at a severe disadvantage. Most programmers working on scientific and engineering problems are college graduates with degrees in engineering, physics, or mathematics.

Employers who use computers to process business records generally place less emphasis on educational requirements. Many of them regard previous experience in related work—in machine tabulation, for example, or in payroll work or accounting—as more important than formal schooling. They fill as many of their

programmer positions as possible by promoting qualified employees with such experience. When they find it necessary to hire outsiders—as they often do—some of them accept high school graduates who appear to have the special qualifications desired, whereas others require education beyond high school. College courses in the general field of electronic data processing, or in accounting, business administration, engineering, and mathematics are regarded as especially good preparation for programmers who will be working with business records.

Entrance requirements for Government jobs are similar to those in private industry. For practically all entry programmer positions in the Federal Government, persons hired must have a college degree, preferably with training in mathematics, or else they must have had the equivalent of such preparation in previous work experience. As in private industry, college training in specialties such as physics or mathematics may be required for programming some technical problems.

A programmer starting out on his job usually attends training classes for a period of 5 or 6 weeks. The training period may be somewhat longer than this if the instruction includes special techniques such as numerical analysis, and somewhat shorter for the limited number of individuals who have had an opportunity to learn something about the field of electronic data processing in high school or college. Trainees who demonstrate their aptitude of programming during this initial period of instruction usually continue with further specialized training while they are working on minor programming assignments.

A year or more of experience is usually necessary before a programmer can learn to handle all aspects of his job without close supervision. Once he becomes skilled at it, his prospects for further advancement are good. An experienced and capable programmer in an organization employing several people in this occupation may move up to a senior job with supervisory responsibilities. Promotion may be possible also to a position as methods analyst. Still other programmers advance to management positions with their firms.

### Employment Outlook

Employment opportunities for programmers are expected to remain very good throughout the 1960's. There will be thousands of new jobs each year, particularly in firms which use their computers to process business records and control manufacturing processes. Employment will also rise in the scientific and engineering field, but somewhat less rapidly.

The employment increase during the next 10 years will continue a trend which has been underway for several years, and the factors underlying it will be much the same as in the past. The first program was written and the first computer put to work fewer than 20 years ago, and only since the mid-1950's have computers ceased to be a rarity. During the past 5 years or so, as equipment has been continually changed and improved, thousands of computers have been installed and put to hundreds of different uses in private and public organizations of all kinds. With further development in computer technology, the number of computers will increase still further and unquestionably there will be a need for many more programmers. There are likely to be more opportunities, also, for young people to obtain advanced training for this occupation.

Other changes already underway or in prospect may affect the occupation of programmer in ways which are more difficult to foresee. During the years ahead, advances in computer technology can be expected to continue and computers will undoubtedly be put to an ever increasing number of new uses—with the result that important changes may well take place in the nature of the work to be done by programmers. It appears likely that eventually much of the time-consuming and routine work associated with writing a program may be eliminated and, as more programs are developed for processing new kinds of problems, the job of getting a problem ready for processing on a computer will involve more analytical work and less that is routine. Programmers may thus have to spend more of their time on preliminary analysis than is now the case; or, as an alternative, it may become much more common for two types of workers to share the job—one to handle the preliminary analysis and planning

which is now sometimes done by methods planners and systems analysts, and the other to work on the detailed machine instructions which comprise the program.

Even though the net effect of these developments may be to reduce somewhat the amount of time a programmer spends in preparing work for a computer, a very rapid increase in the number of programmers is likely to take place during the next decade—an increase which some industry spokesmen think may bring the total to more than 200,000 by 1970. Although this expansion in employment will undoubtedly be the main source of job openings in the years ahead, there will also be a good many openings as programmers leave their jobs to take other types of positions. Because this is still a small occupation which includes many comparatively young workers, relatively few positions are likely to become vacant because of retirement or death.

### **Earnings and Working Conditions**

Salaries for programmers employed by business firms ranged from \$4,000 a year for some beginners in 1960 to more than \$13,000 for a few employees in top supervisory positions, according to a private survey which covered nearly 500 companies in all parts of the country. Most trainees working under very close supervision earned from \$5,000 to \$6,000 a year; for most programmers with sufficient experience to work without close supervision, salaries were between \$5,500 and \$6,500; and for senior programmers and others doing technical work and carrying supervisory responsibilities, salaries were usually between \$7,000 and \$9,000. The majority of programmers in top supervisory jobs earned from \$8,000 to \$11,000 a year. These salary levels apply only to employees classified as programmers; those responsible primarily for systems analysis generally earned from \$500 to \$1,000 a year more than programmers.

The survey indicated substantial differences

in the salaries of the lowest and highest paid individuals in the same kinds of positions. Within almost every group, there were a few earning almost twice as much as others. These salary differences were probably due to differences in the kind of data processed and computer used, the industry involved, and the part of the country where the worker was located. Also, experienced and skilled programmers are as yet so few in number that they can sometimes command salaries considerably above the average.

Salaries paid by the Federal Government are roughly comparable with those in private industry. The minimum entrance salary for beginners was \$4,345 a year in 1960 and top salaries paid experienced programmers responsible for complex programming or supervisory and administrative work were about \$11,000 or, in a few cases, \$14,000 or more a year. The great majority of programmers in the Federal Government earned between \$5,000 and \$9,000 a year.

The standard workweek for programmers is usually the same—35 to 40 hours—as the workweek for other professional and office workers at their places of employment. Unlike many of the people who operate computer consoles and peripheral equipment and work on a 2- or 3-shift basis, programmers usually work only during the day. Occasionally evening or weekend work may be necessary—for example, when it proves particularly difficult to “debug” a program.

Work places are usually modern offices, well-lighted and air conditioned. Employers recognize the desirability of providing better-than-average work surroundings insofar as possible, because programmers working under such conditions can concentrate more readily on the very exacting kind of analysis which is an essential part of their job.

### **Where To Go for More Information**

Association for Computing Machinery,  
14 East 69th St., New York 21, N.Y.

## Psychologists

(D.O.T. 0-36.21 through .26)

### Nature of Work

Psychologists seek to understand people and explain why they act as they do. They study the behavior of individuals and groups and often help them to achieve satisfactory personal adjustments. Their work includes varied activities such as teaching in colleges and universities, counseling individuals, planning and conducting training programs for workers, doing research, providing expert advice on psychological methods and theories, and administering psychology programs in hospitals, clinics, research laboratories and other places.

There are several ways in which psychologists may obtain information about people's capacities, traits, and behavior. They may interview and observe individuals, develop and use tests and rating scales, and study personal histories. In addition, psychologists who want to learn about the opinions held by groups of people often conduct surveys, either orally or by using written questionnaires. Some of their work is of a highly statistical nature.

Since no one person can know all there is to know about behavior, psychologists usually specialize in one of the many interrelated branches of the profession. Clinical psychologists are the largest group of specialists. Generally, they work in mental hospitals or clinics and are concerned mainly with problems of maladjusted or disturbed people. They interview patients, give diagnostic tests, and provide individual and group psychotherapy. Other specialties in psychology include child or developmental psychology (the study of very young children and teenagers); social psychology (the study of the social forces that affect individuals and groups); comparative psychology (sometimes called animal psychology); physiological psychology (the relationship of behavior to physiological processes); counseling psychology (helping people achieve satisfactory personal, social, educational or occupational adjustments); educational psychology (the study of learning processes); and industrial psychology (developing techniques for selecting

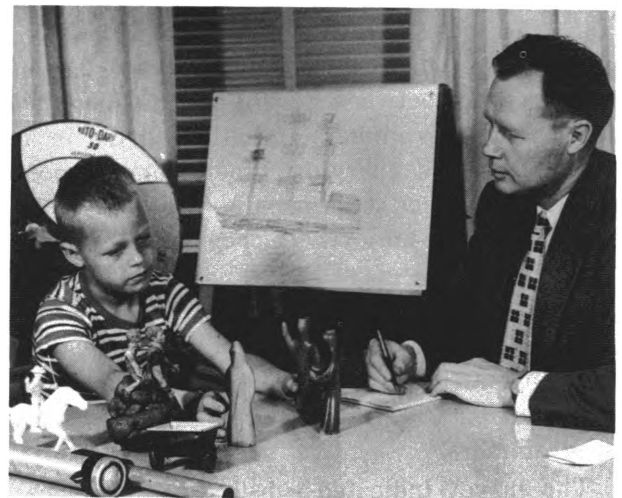
and training workers and improving worker motivation and morale).

### Where Employed

The places where psychologists work range from college classrooms to hospital wards and from research laboratories to business offices. Most are employed in large cities and in university towns, but a sizable number are on the staffs of institutions located in rural areas. Altogether, about 25,000 psychologists were professionally employed in late 1960.

Colleges and universities employ the largest number of psychologists—more than one-third of the total. Government agencies—Federal, State, and local—employ the second largest group. Within the Federal Government, the agencies which have the most psychologists are the Veterans Administration, the Department of Defense, and the Public Health Service of the Department of Health, Education, and Welfare.

Sizable groups also work for elementary and secondary schools, for private industry, and for nonprofit foundations, hospitals, and clinics. A small number are in independent practice, and some serve as commissioned officers in the Armed Forces and the Public Health



Courtesy of National Institutes of Health  
*Psychologists diagnose mental problems by studying children's reaction to toys.*



Service. In addition to positions with the title "psychologist," many personnel and administrative jobs are filled by persons trained in psychology.

### Training and Other Qualifications

The master's degree with a major in psychology is the minimum educational requirement for professional employment in the field. Psychologists with this degree can qualify for jobs such as assisting in the administration and interpretation of psychological tests, collecting and analyzing statistical data, assisting in research experiments, and performing routine administrative duties. In addition, they may teach in colleges, assist in counseling students, or—if they have had previous teaching experience—act as school psychologists or counselors. (See statement on school counselors, p. 46.) Those with bachelor's degrees sometimes obtain routine jobs in work related to psychology or other fields where training in psychology is helpful.

The Ph. D. is needed for many entrance positions and is becoming increasingly important for advancement. Psychologists with doctorates are eligible for the more responsible research, clinical, and counseling positions, as well as for the higher level positions in colleges and universities.

At least 1 year of full-time graduate study is needed to earn the master's degree, and most students take longer. For the Ph. D. degree, a total of 5 or 6 years of graduate work is usually required. In clinical or counseling psychology, the requirements for the Ph. D. degree generally include 1 year of internship or supervised experience. To an increasing extent, internships are also being required in other specialties such as industrial, teaching, and social psychology. The American Board of Examiners in Professional Psychology offer diplomas in the specialties of clinical, counseling, and industrial psychology to those with outstanding educational records and experience who can pass the required examinations.

Some universities require an undergraduate major in psychology for admission to graduate work in that field. Others prefer students with

a broader educational preparation, including not only some basic psychology courses but also courses in the biological and physical sciences, statistics, and mathematics.

Many graduate students receive financial help from universities and other sources in the form of fellowships, scholarships, or part-time employment. Several Federal agencies provide funds to graduate students, generally through the educational institution giving the training. The Veterans Administration offers a large number of predoctoral traineeships, during which time the students are paid for part-time employment with that agency. The Public Health Service of the U.S. Department of Health, Education, and Welfare supports doctoral study in psychology by providing funds for research in the field. In addition, the National Science Foundation and the U.S. Office of Education offer large programs of financial aid, including fellowships, grants, and loans.

Psychologists desiring to enter independent practice must meet certification or licensing requirements in an increasing number of States. Sixteen States—Arkansas, California, Connecticut, Florida, Georgia, Kentucky, Maine, Maryland, Michigan, Minnesota, New Hampshire, New York, Tennessee, Utah, Virginia, and Washington—had such requirements in mid-1960.

### Employment Outlook

Employment opportunities for psychologists with doctor's degrees will probably continue to be excellent through the mid-1960's. Psychologists with master's degrees are likely to be in considerable demand but their opportunities for full professional employment will be less favorable than for those with the Ph. D. degree. In late 1960, the American Psychological Association estimated that there were many more vacancies in the field than there were qualified psychologists to fill them. A great shortage of clinical psychologists existed in State mental hospitals and mental hygiene clinics; psychologists were being sought to fill vacancies in both elementary and secondary schools; and a number of openings in research, clinical, and counseling positions were reported

by several agencies of the Federal Government. Continued rapid expansion of this profession is likely throughout the 1960 decade.

A large increase is anticipated in the number of psychologists employed by State agencies. Currently understaffed mental hospitals and mental hygiene clinics will need many clinical, counseling, social, and physiological psychologists. Prisons, training schools, and other State institutions are expected to use psychologists more extensively in the future.

Increasing awareness of the need for testing and counseling children, plus growing school enrollments, are expected to increase the employment of psychologists in both elementary and secondary schools. In colleges and universities, more psychologists will be needed in student personnel work, as well as in teaching, to meet growing enrollments during the 1960's. (See statement on College and University Teachers, p. 43.) The trend toward greater use of psychological techniques by private industry is likely to continue, thereby creating new openings for experimental, industrial, personnel, and human engineering specialists.

Many openings for psychologists with Ph. D. degrees who are specialists in clinical, counseling, experimental, human engineering, physiological, social, and personnel psychology are expected in the Veterans Administration, the Department of Defense, in State programs, and in local communities. It should be kept in mind, however, that in the case of Federal Government positions, the number is dependent on funds appropriated annually by Congress.

Some vacancies will occur each year owing to retirements and deaths. However, such openings will be relatively few during the early

1960's because psychologists as a group are young. The transfer of psychologists to work of a purely administrative nature may also create some job vacancies. Most opportunities, however, will result from the rapid expansion that is anticipated for the profession.

### **Earnings and Working Conditions**

Beginning salaries in late 1960 were generally between \$5,000 and \$6,000 a year for psychologists with master's degrees and between \$7,000 and \$8,000 for Ph. D.'s, according to the limited data available. In the Federal Government, psychologists with the doctorate and limited experience could start at about \$7,500. Salaries of experienced psychologists are considerably higher.

### **Where To Go for More Information**

General information on career opportunities, certification or licensing requirements, and also a list of universities with approved doctoral programs in clinical and counseling psychology may be secured from:

American Psychological Association,  
1333 16th St. NW., Washington 6, D.C.

Information on traineeships and fellowships may be secured from colleges and universities with graduate psychology departments and from the following Government agencies:

Chief Medical Director, Department of Medicine  
and Surgery,  
Veterans Administration, Washington 25, D.C.  
Training Branch, National Institute of Mental  
Health,  
National Institutes of Health, Bethesda 14, Md.

## **Social Workers \***

(D.O.T. 0-27.06 through .50)

### **Nature of Work and Where Employed**

Social workers help people who have individual or family difficulties which interfere with healthful and useful living. They arrange for counseling services, job guidance, money grants,

medical care, or other types of aid. To help people improve their social relationships, as well as assist them in the process of growing up, some social workers conduct leisure-time programs and informal educational activities. Others are engaged by communities to help plan and develop health, welfare, and recreation serv-

\* Prepared by the Women's Bureau, U.S. Department of Labor.

ices on a broad scale for a neighborhood or larger area.

An estimated 105,000 social workers were employed in the United States in the spring of 1960. (This figure excludes recreation workers, whose training and qualifications differ from social workers.) Nearly two-thirds of the social workers worked for Federal, State, county, or municipal government agencies in public assistance, child welfare, and other welfare programs. The remainder were employed primarily by voluntary (privately operated) agencies, which are supported by contributions, endowments, and sometimes fees paid by the people served. An estimated 800 social workers were self-employed as caseworkers, group workers, or research consultants.

In 1960, almost 60 percent of the social workers were women; however, the proportion of men in the field has been increasing. The majority of executive positions in social work were held by men, as well as about one-third of the positions in case work and one-half in group work.

*Social Caseworkers.* Almost half of all social workers are caseworkers, working directly with individuals or families. Social problems may arise from a number of causes, such as insufficient income, illness, poor household management, or poor relationships with other family members—to name a few. Caseworkers may help to arrange for financial assistance, homemaker services, vocational guidance, foster family or institutional care, or health services. In addition, through interviews with their clients, caseworkers try to modify feelings, attitudes, and behavior which are detrimental to normal adjustment and development. Frequently, they are instrumental in keeping a family together.

Family casework is carried out by both public and voluntary agencies. Both have as their aim the improvement and strengthening of family life and the establishment of satisfactory relations between the family and the community.

*Public assistance workers*, the largest single group of social workers, number about 35,200. They work largely for State and local government agencies on public welfare programs

which extend financial assistance to needy persons (primarily the disabled, blind, or aged), unemployed persons, and dependent children. Their duties include determining their clients' needs and whether their clients are eligible for financial assistance; explaining pertinent laws and requirements; and providing or arranging for other needed social services.

In addition, about 8,600 *family service workers* are employed principally by voluntary agencies. Workers in a voluntary agency primarily provide counseling services to families and individuals.

Government and voluntary agencies combined employ approximately 16,600 *child welfare workers*, who deal with children having difficult family interrelationships, behavior problems, and mental or physical handicaps. These workers may perform such duties as finding foster homes or instituting legal action for the protection of neglected or mistreated children, arranging for homemaker service during the illness of a mother, arranging for adoptions or placements in specialized institutions, counseling a youthful delinquent who has been brought into juvenile court, or advising parents on their children's problems.

About 2,400 *school social workers* or "visiting teachers" are employed by school systems to help troubled children. They may work with children who are excessively shy, aggressive, or withdrawn; failing in school subjects for no apparent reason; hungry or ill; truant; or have other social problems. Workers consult with parents, teachers, principals, doctors, truant officers, and other interested people. Frequently, they refer a child to other social work agencies in the community for help.

More than 3,400 *medical social workers* are employed by hospitals, clinics, health agencies, rehabilitation centers, and public welfare agencies to work directly with patients and their families in helping them cope with problems resulting from illness, recovery, and rehabilitation. Usually these workers function as part of a medical team composed of doctors, nurses, and therapists.

The approximately 5,200 *psychiatric social workers* assist mental patients in their return to community life. Most work in mental hos-



Courtesy of U.S. Veterans Administration

*Medical social worker and convalescent discuss social problems related to his injury.*

pitals or mental-health clinics for adults and children. In clinical teams composed of psychiatrists, psychologists, and other professional personnel, these workers help patients and their families to understand the nature of the illness, enlist the patients' aid in using the various kinds of help available, and guide the patients in their social adjustment to their homes and communities. Medical and psychiatric social workers are grouped together as "clinical social workers" in some organizations. The Veterans Administration is the largest employer of clinical social workers.

The 2,500 *social workers in rehabilitation services* assist emotionally ill or disabled persons in adjusting to the demands of everyday living. As part of a rehabilitation team, which usually includes physical or occupational therapists, these social workers serve as a link with the community while patients are in the hospital and later help them adjust to home and community life.

Approximately 10,200 *probation and parole officers* and other correctional workers are employed primarily by Federal, State, county, and city governments. These workers assist probationers, parolees, and juvenile offenders in their readjustment to society. In the course of their work, they make investigations and submit reports to the courts concerning the activities of

their clients. They also counsel their clients and may help them find jobs; keep a close watch on their clients' conduct; and direct them to other services in the community when possible. In addition, they frequently arrange for child placements or adoptions, provide marriage counseling, and collect court-ordered payments for support of families and children.

*Social Group Workers.* Nearly 10,900 social group workers are employed by a multitude of agencies—settlements and community centers; youth-serving groups; public housing developments; correctional institutions; resident and day centers for children, adolescents, or elderly people; and general and psychiatric clinics and hospitals. Group workers help individuals to develop through group experience in educational, recreational, or other social activities. They may plan or direct group activities; recruit, train, and supervise volunteer workers; or administer departments and agencies which provide social group services.

*Community Organization Workers.* Approximately 7,600 social workers are engaged in community organization work. They plan welfare, health, and recreation services for the community; coordinate existing social services; develop volunteer leadership; and assist in fund raising for needed community social welfare activities. Usually, these workers are employed by community chests or united funds, community welfare councils, race relations programs, religious federations, mental health associations, health federations, agencies which combine community planning and direct service, professional groups in the field of social work and related fields, or conference groups. Unlike other phases of social work, this field employs a majority of men.

*Other Social Workers.* Almost 900 social workers are teaching in schools of social work. Another 800 are engaged in programs providing services to the aged in institutions. Numerous others conduct social research, determining the needs for social services, measuring the services offered, evaluating social work operations, and testing social work techniques and methods of

research. Most of these research workers are employed by welfare councils and foundations, public assistance and child welfare agencies, adult offender services, and schools of social work.

A small number of experienced social workers from the United States are serving in other parts of the world. They may work as consultants in the rehabilitation of the disabled, as teachers in schools or seminars, or as technicians in setting up agencies, schools, or assistance programs. They may be employed by the Federal Government, the United Nations or one of its affiliated groups, national professional associations, or voluntary agencies.

### **Training, Other Qualifications, and Advancement**

Social work education is virtually the same for all types of professional social work. Full professional status requires the completion of a 2-year program of graduate study in an accredited school of social work. About one-fifth of the social workers employed in 1960 had 2 or more years of graduate study in a school of social work, and a master's degree.

Effective December 1, 1961, the National Association of Social Workers (NASW) has established a plan for the certification of professional social workers. To be eligible for certification, social workers must have 2 years of paid employment in social work and 2 years of membership in NASW (open only to graduates of accredited schools of social work). Those found qualified are identified as members of the Academy of Certified Social Workers (ACSW).

There were 56 schools of social work in the United States accredited by the Council on Social Work Education in 1960. Of these, 13 schools offered study beyond the master's degree level. For admission to a graduate school of social work, a student must have a bachelor's degree, preferably with a background in liberal arts. Undergraduate work should preferably include courses in economics, history, political science, psychology, sociology, social anthropology, biology, and statistics. Courses in journalism and public speaking may also be helpful to social workers in interviewing, writing re-

ports and case histories, and participating in conferences.

In 1958-59, nearly 10,500 students were enrolled in schools of social work; of these, about two-fifths were attending part time. During that year, about 1,900 persons completed the 2-year program of study. Many scholarships are available for graduate education. More than three-fourths of the full-time students in graduate schools are receiving some scholarship aid. Scholarships are offered by voluntary agencies, community welfare councils, graduate schools, foundations, and civic groups. The average scholarship or assistantship per student amounted to \$1,755, according to a 1957 study by the Council on Social Work Education.

Social welfare agencies prefer to hire graduates of schools of social work. However, as a result of the shortage of personnel, many social welfare agencies do not require graduate education for opening positions. Some of these agencies, both voluntary and public, offer plans whereby workers can take "educational leave" to obtain graduate education. Some of these plans pay expenses and/or a salary to students taking a full-time course of study; others provide for part-time attendance in classes. Some agencies have work-study plans in which students are paid for current services and are allowed time off for study. Others offer scholarship aid if the students agree to return for a specified period of employment.

Although persons with only a bachelor's degree are hired by many agencies, opportunities for advancement are limited without graduate education. In voluntary family and children's agencies, graduation from a school of social work is required for employment. Employment in social group work, community organization, research, and many administrative positions generally is also limited to graduates of schools of social work. For teaching positions, a master's degree in social work is required, and a doctorate is preferred. In research work, training in social science research methods is required, in addition to social work education and experience. Most entrance jobs in State public assistance and public child welfare agencies require a bachelor's degree as a minimum.

In all States, beginners must pass a written examination in social work.

Personal qualities which are essential for social workers include emotional maturity, objectivity, a basic interest in people and their social problems, and ability to promote good working relationships and encourage social adjustment in others. Individuals planning careers in the field should try to obtain as much experience as possible during high school and college to determine whether they have the interest and capacity for professional social work. They may do volunteer, part-time, or summer work in such places as camps, settlement houses, community centers, or social welfare agencies. Many social welfare agencies, both voluntary and public, hire college students and, in some cases, high school students for non-clerical jobs assisting social workers in case and group work.

### Employment Outlook

Throughout the 1960's, the yearly demand for social workers with graduate education is expected to remain in the thousands. More workers will be needed to maintain existing service programs for the increasing population and to staff new facilities for such groups as elderly people, children of migrant workers, mental patients, juvenile delinquents, and handicapped persons, including facilities in other countries. In addition, workers will be needed to replace those who retire, die, or leave the profession.

In 1960, there were about 12,000 vacancies in social work. The need for trained social workers is acute, particularly in group work agencies, correctional agencies, and mental health services. Significant numbers of openings are also currently reported in public assistance, voluntary family services, and child welfare agencies. In setting their future service goals, public assistance and public child welfare agencies estimate that they will require 34,000 more trained workers by 1970. However, up to 1958-59, fewer than 2,000 persons were being graduated yearly from schools of social work.

As a result of the shortage of trained personnel for social work, there is increasing op-

portunity for part-time employment of qualified persons. Some part-time positions exist, especially in voluntary social work agencies engaged in family casework and group work. Many more agencies also expect to recruit, on a part-time basis, married women who have had education and experience in social welfare.

### Earnings and Working Conditions

Social workers employed in direct-service positions, such as casework or group work, received an average (median) salary of \$4,800 in 1960—women, \$4,590 a year and men, \$5,060. In the same year, social workers in supervisory positions averaged \$6,220 a year, and in executive positions, \$6,470.

Average salaries of social workers in selected programs in 1960 are shown in the following tabulation:

	<i>Case- workers</i>	<i>Group workers</i>
Psychiatric social work (in hospitals)	\$5,500	----
Medical social work (in hospitals).....	5,150	----
Family services (excluding public assistance) .....	5,100	\$5,560
Child welfare work (noninstitutional)	4,730	5,050
Community organization work .....	4,350	4,690
Group work .....	----	4,620
Public assistance .....	4,320	----

Graduates of schools of social work generally received the highest average salaries in the field. For example, among social workers in direct-service positions in 1960, women with a master's degree in social work averaged \$5,920; those with a bachelor's degree and no graduate study, averaged \$4,270. Men in the same positions averaged \$6,160 and \$4,600, respectively.

Starting salaries for caseworkers with graduate education, as reported by State agencies in 1960, averaged \$4,140 in public assistance work and \$4,320 in child welfare work. However, for those without graduate education, State agencies paid roughly \$600 a year less in both fields. In the Federal Government in 1961, graduates of schools of social work with no experience received starting salaries of \$5,355 a year, and those with 1 year of experience received \$6,435.

The National Association of Social Workers at its Delegate Assembly in 1958 recommended

that \$5,400 a year be set as the standard for starting salaries of social workers with full professional training and \$10,000 after 10 years of experience in social work.

The predominant scheduled workweek for social workers is 40 hours; however, as many as one-third regularly work 37½ hours or less a week. In some social work agencies, the nature of the work requires evening and/or weekend work, for which social workers usually receive compensatory time off. Virtually all social work agencies provide fringe benefits such as paid vacations and sick leave and retirement plans.

#### **Where To Go for More Information**

Information on accredited graduate schools of social work, colleges with undergraduate departments offering preprofessional courses in social work, scholarships available for graduate work, as well as information on social work as a career, may be obtained from:

Council on Social Work Education,  
345 East 46th St., New York 17, N.Y.

Information on employment standards may be obtained from:

National Association of Social Workers,  
95 Madison Ave., New York 16, N.Y.

# Clerical and Sales Occupations

## CLERICAL AND RELATED OCCUPATIONS

### Nature of Work

Nearly 10 million people did clerical or some closely related kind of work in 1960. Workers in this group, numbering more than those in any other occupational group except semi-skilled operatives, do the vast amount of record-keeping and routine paperwork required in modern business and government offices; they handle communications through mail, telephone, telegraph, and messenger services; and they attend to the shipping and receiving of merchandise, ring up sales on the cash registers of stores and restaurants, and do related kinds of work.

For women, clerical work is a particularly important field of employment. Two-thirds of all clerical workers are women, and almost one-third of all women who have jobs of any kind do clerical work.

One out of every four clerical workers in 1960 was a stenographer, typist, or secretary. Many other clerical workers were employed in such large occupations as bookkeeper, office machine operator, mail clerk and carrier, and telephone operator. Smaller clerical occupations, all of which involve responsibility and experience on the part of the worker, include airline ticket agent, railroad station agent and telegrapher, and bank teller. The occupations just mentioned provide employment for about half of all clerical workers. For each of them, this Handbook contains a report discussing duties, training, earnings, and outlook. (See index for page numbers.)

The many remaining occupations in the clerical category represent a wide variety of skills and training. They include, for example, the census taker, theatrical agent, railway baggageman, and notary public, as well as many occupations which afford employment op-



*Most clerical workers are women.*

portunities for a large number of beginners without specialized training—messengers and file clerks in offices, for example, and checkers in supermarkets.

### Training, Other Qualifications, and Advancement

For all but the most routine clerical positions, the minimum educational requirement is usually graduation from high school. Beginners often find that instruction in business subjects and familiarity with the operation of the simpler office machines are helpful in getting a job. Frequently, however, new employees are taught on the job to operate billing machines, telephone switchboards, transcribing machines, electric typewriters, or other equipment which they will be using. A good many companies participate in work-study programs operated cooperatively with local high schools and business schools. Young people who have had some



part-time work experience under these programs are often given preference when seeking jobs after graduation.

Some employers give special tests which indicate how quickly and accurately applicants will be able to do certain office work. Ability in arithmetic, in spelling and grammar, and in reading comprehension is often helpful to a beginner in obtaining a job. Ability to get along with other people is also rated high among the qualifications necessary for success in office work.

Opportunities for advancement are likely to be limited for workers who have only the minimum educational background needed for routine positions. Many people in clerical occupations are high school graduates with some additional education in colleges or private business schools. Some are college graduates, who start out as office workers so that they may gain experience in a particular industry or business, with the idea of later advancing to professional or administrative positions with their firms.

Often the preferred clerical jobs—secretary, information clerk, and others requiring a general knowledge of company policies and procedures—are filled by promotion from within. Seniority is an important consideration in selecting employees for promotion to better jobs, but emphasis is also placed on the individual's ability and personal qualifications for the job which is to be filled. In some kinds of office work, promotion may be to more difficult assignments at higher salaries, as in the case of the office machine operator who is selected for training in the operation of more complex office equipment. In some firms, promotion may eventually lead to a minor supervisory position, or to the position of office manager.

### **Employment Outlook**

Hundreds of thousands of openings will occur in clerical and related occupations each year during the 1960's. Most of them will arise because of the need to replace workers who retire or stop working for other reasons. Employee turnover is especially high among women office workers because many of them work for only a few years and then leave their jobs in

order to stay at home and care for their families. A private survey of several hundred firms in 1958 disclosed that more than one out of every four office positions became vacant during the year because of turnover and had to be filled by hiring either new workers just out of school or experienced workers shifting from other jobs.

In addition to the openings which will occur as jobs are vacated, many others will be created as population and the economy grow during the next decade. By 1970, there may be about 2.5 million more people in clerical and related occupations than in 1960. The numbers of postal workers, cashiers in stores and restaurants, bill collectors, and many other clerical workers, are likely to rise at approximately the same rate as the growth in the working population as a whole. In a few occupations—notably telephone operator and railroad telegrapher, and station agent—there will probably be an actual decline in employment. Among workers who handle the paperwork which is so often necessary in large private or public organizations, however, the employment increase during the 1960's will probably be fairly rapid. As in the past, many business organizations will be increasing in size and complexity and, as they do, the volume of correspondence and record-keeping will become greater. In addition, as they expand, many firms will find it necessary to establish centralized management services or enlarge existing ones, and to assume new office functions in order to control and coordinate activities in such areas as advertising, research, accounting, sales, and personnel administration. These factors will add to the number of clerical workers needed to keep the wheels of business in motion.

Among the kinds of business activities which are expected to grow rapidly during this period are banking and insurance, both of which employ a great many clerical workers. A particularly large number of new clerical jobs are likely to arise also in educational institutions, hospitals, and other professional service organizations. Manufacturing and trade will continue to be very important sources of new jobs also.

Perhaps 3 out of every 10 of the clerical jobs

which will be created during the next decade will require people trained for secretarial, stenographic, and typing positions. In secretarial and stenographic work, employment is likely to rise considerably faster than in most other clerical occupations. For typists, employment will also rise, but somewhat less rapidly because of the likelihood that increased use of duplicating and other office machines will eliminate much routine typing and related clerical work.

In addition to the openings that will occur each year in these three large occupations, many additional thousands of jobs are anticipated for such major groups of clerical workers as bookkeeping or accounting clerk, order clerk, shipping and receiving clerk, and mail clerk. The number of office machine operators is expected to rise particularly fast; this growing but still relatively small group, which includes operators of electronic and other kinds of data-processing equipment, is expected to grow faster during the 1960's than any other one group of clerical workers.

The expected rise in clerical employment during the next 10 years would probably be much greater than is here estimated, were it not for the increasing use which will undoubtedly be made of mechanical equipment for many routine tasks performed by workers in this occupational group. The dial switchboards installed by many telephone companies have already reduced the number of operators required to handle telephone calls, for example; and as this kind of equipment is used more widely for long distance and other telephone calls, it is likely to displace still more operators. To a much lesser extent, mechanical equipment is also being used for routine duties performed by such workers as bank tellers and post office clerks. But the greatest impact of automation in the next 10 years promises to be on the office workers who handle a large volume of relatively routine and standardized paperwork. Calculating and bookkeeping machines, electronic computers, and a variety of other mechanical devices have already greatly reduced the number of clerical workers needed by firms which make extensive use of such equipment. As this mechanization continues and more and more machines are used for such tasks as preparing

payrolls, billing customers, and keeping track of inventories, still other firms will find their needs can be met with fewer office employees.

Office employment will probably continue to expand during the 1960's, despite the fact that some jobs will be shifted to machines. Paperwork connected with business transactions of all kinds will be increasing, and in most business concerns, it will continue to be handled in much the same way as in the past. Electronic computers and other expensive equipment can be used economically only in offices with a very large volume of paperwork—and even in such offices, some of the clerical jobs which are eliminated as equipment is installed, are replaced by new jobs for equipment operators. But in both large and small offices, mechanization is unlikely to have any material effect on the work of secretaries and receptionists, of people responsible for collecting bills and handling complaints, and of other office workers whose duties bring them in contact with the public and require them to use initiative and judgment.

### **Earnings and Working Conditions**

Women in beginning office jobs, such as junior file clerk and office girl, had average weekly salaries ranging from about \$50 in some cities to \$60 in others, according to a 1959-60 survey of business and industrial firms in 60 large metropolitan areas. The averages for women in jobs combining switchboard operator and receptionist duties ranged from about \$50 to \$75 a week in the cities surveyed, and the averages for women employed as payroll clerks from about \$60 to \$85. Men generally had somewhat higher salaries than women in similar jobs; office boys averaged about \$3.50 a week more than office girls, for example, and men employed as payroll clerks about \$20 a week more than women in such positions.

Office workers' salaries tended to be highest in very large metropolitan centers, particularly in the North Central and West Coast regions of the country, and lowest in the southern cities surveyed (except for a few where high wage industries were located). Regardless of the area of the country, the salaries of office workers tended to be somewhat higher in man-

ufacturing firms than in retail stores and other nonmanufacturing industries.

Most of the office workers were on a 40-hour week. In a few areas—Boston, Philadelphia, and Newark—Jersey City—the workweek was generally 37½ hours; and in the New York City area, over 40 percent of all office workers were on a 35-hour schedule.

Almost all of the office workers covered in the survey received at least 6 paid holidays a year and a large number received 8 or more. In Boston and New York City, 11 or more paid holidays were commonly allowed. Practically all companies also gave employees 1 or 2 weeks' paid vacation after 1 year of service. Most of them extended this to 3 weeks for employees with 15 years of service; many firms gave employees with 25 years' service a 4-week vacation. Life insurance, hospitalization, surgical and medical insurance, and sick benefits were also generally available to office workers in the great majority of the cities surveyed. Retirement pension plans, supplementing benefits to employees under the Federal social security program, were offered to more than half of all the office workers covered by the survey.

### Where To Go for More Information

A list of career materials may be obtained by sending a stamped and self-addressed envelope to:

United Business Education Association (Department of the National Education Association),  
1201 16th St. NW., Washington 6, D.C.

Information on the training given in private business schools may be obtained from:

Guidance Department, National Association and Council of Business Schools,  
2400 16th St. NW., Washington 9, D.C.

A discussion of the effect of electronic computers on employment of clerical workers is contained in the following publication:

Adjustments to the Introduction of Office Automation, BLS Bull. 1276, 1960. Superintendent of Documents, Washington 25, D.C., Price 50 cents.

Further information on earnings and working conditions is contained in the following publication:

Wages and Related Benefits, 60 Labor Markets, 1959-60, BLS Bull. 1265-62, 1961. Superintendent of Documents, Washington 25, D.C. Price 70 cents.

## Secretaries, Stenographers, and Typists \*

(D.O.T. 1-33; 1-37)

### Nature of Work

In 1960, nearly 2.4 million persons were employed in occupations which required typing or stenographic skills. More than 95 percent of these workers—who are usually designated as typists, stenographers, or secretaries—were women. Although duties and job titles vary markedly among places of employment, typing skill is a basic requirement for entry into any of these occupational categories.

*Typists* (D.O.T. 1-37.32) spend a major portion of their time making typewritten copies of printed or written materials. Junior typists usually work from handwritten or typed drafts. They may set up simple tables or copy properly spaced but more complex tables. Senior typists copy material in final form from

“rough” or involved drafts. They are usually expected to understand common technical terms, abbreviations, and printer's symbols and to be able to rearrange or combine materials from several sources. They may have to plan and type complicated statistical tables.

Typists may be required to operate either manual or electric typewriters; an increasing number of offices furnish electric machines. Some offices have installed electric typewriters equipped with special keyboards for transcribing coded program instructions for electronic data-processing operations.

Many typists also perform other duties such as filing, answering telephones, checking and proofreading copy, recording information in longhand, sorting mail, and operating calculators, tabulators, and duplicating or other office machines.

\* Prepared by the Women's Bureau, U.S. Department of Labor.

*Stenographers* (D.O.T. 1-37.12), besides performing straight typing, take dictation from one or more persons, either in shorthand or by using stenotype machines. Stenographers operating these machines, usually called *stenotype operators* (D.O.T. 1-37.14), transcribe their notes on a typewriter.

Many stenographers also compile and type reports, answer telephones, and operate switchboards; some operate various types of office machines and perform other clerical duties. Stenographers may be classified as junior or senior stenographers, depending upon their experience and the amount of supervision they receive. They may be classified as technical stenographers if the subject matter usually dictated involves a specialized field such as science, medicine, or law. A few stenographers become specialists in foreign languages, police work, or public or court stenography.

*Court reporters* (D.O.T. 1-37.18), who make verbatim reports of proceedings in a court of law, and conference reporters or other specialized shorthand reporters must be able to record difficult technical language at a high rate of speed and with a high degree of accuracy, sometimes from many speakers, and for several hours at a time. Some reporting of this type is done by means of microphone equipment attached to a recording or dictating machine. The reporter identifies the speakers and reports what is heard (edited and punctuated) into a recording machine. Some court reporters use stenotype machines.

*Secretaries* (D.O.T. 1-33), in addition to stenographic duties, usually handle a variety of business details on their own initiative. For example, they may acknowledge correspondence, schedule appointments and meetings, and obtain different kinds of information. Many serve as representatives of their employers, relieving them of numerous routine duties and the supervision of clerical personnel. They often handle correspondence and records of a private or confidential nature.

The degree of responsibility a secretary has depends largely on the position her employer holds. Private secretaries usually work for key executives or for professional persons and may have more varied work assignments than sec-

retary-stenographers and junior secretaries. Secretaries who advance to the rank of executive secretary act as administrative assistants to top executives and often are given authority for making certain decisions, for planning office routine, and for public relations work.

Some secretaries specialize in legal, medical, engineering, or other types of secretarial work. Legal secretaries take dictation of more than ordinary difficulty and prepare various legal papers such as summonses, complaints, motions, and subpoenas. Medical secretaries take dictation involving medical terminology and sometimes combine secretarial duties with routine laboratory and other semitechnical medical duties; they may type case histories and work on insurance claims. Engineering secretaries take dictation related to such fields as civil, electrical, chemical, mechanical, or aeronautical engineering and sometimes are required to read blueprints.

An increasing number of typists, stenographers, and secretaries do some transcription of letters, reports, or other statements from sound-producing records. Where this is a primary duty, typists called *transcribing machine operators* (D.O.T. 1-37.36) are often employed.

### Where Employed

Typists, stenographers, and secretaries are employed by every kind of business and industry; by Federal, State, and local governments; and by religious, civic, and social organizations. A majority of persons in these occupations work for private employers, but a considerable number are employed by government agencies. Relatively few are self-employed; many of those who are self-employed are called public stenographers.

Typists, stenographers, and secretaries are found in small and large establishments. Legal stenographers and secretaries work for practicing lawyers in law firms, government agencies, banks, large business corporations, unions, and many other types of offices. Some medical secretaries work in small private offices of physicians, surgeons, or dentists. Others work in large establishments, such as hospitals and clinics, medical schools, firms manufacturing

drugs or medical supplies, public health agencies, and health insurance organizations.

### **Training, Other Qualifications, and Advancement**

A broad educational background is of considerable value to a person who wishes to become a typist, stenographer, or secretary. Graduation from high school is almost always a requirement. Completion of a high school business course often satisfies an employer's requirements for beginning typist and stenographer positions.

Adequate performance as a secretary, stenographer, or typist depends upon typing skills and knowledge of spelling, vocabulary, punctuation, grammar, and correspondence procedures. Ability to use office equipment such as voice recorders, calculators, or tabulators is helpful for many jobs. Persons interested in becoming stenographers must also be able to take and transcribe dictation.

The degree of stenographic and typing skill required varies markedly from employer to employer and is sometimes influenced by the demand for, and supply of, typists, stenographers, and secretaries in a community. To qualify for employment with the Federal Government, typists must pass an examination which includes a test covering verbal abilities, a clerical aptitude test (including arithmetic computation), and a typing test in which the applicant must demonstrate the ability to type at a rate of about 40 words a minute. In addition to these three tests, stenographers must demonstrate their ability to take dictation at the rate of 80 words a minute, and shorthand reporters must be able to record material at the rate of 160 words a minute.

On-the-job experience or additional education in business subjects such as business law and office procedures is often necessary to qualify for stenographic and secretarial positions. Some employers require a knowledge of the terminology of a particular field, such as medicine, law, or engineering, or the ability to use a foreign language.

Some public high schools conduct cooperative work-study programs through which students gain job experience before graduation.

There are many possibilities for post-high school training. For the high school graduate who accepts employment and wants to acquire additional skills or further education, night school courses are available in many communities. Some employers also provide training in office skills. Many business schools, colleges, and universities offer training in both daytime and evening classes. Bachelor degrees were conferred in the field of secretarial studies by the schools of business and commerce in 213 colleges and universities in 1958-59. Three universities conferred the master's degree. Many colleges and universities offer 1- to 3-year curriculums preparing students for general, legal, technical, and medical-dental secretarial work. Hundreds of private business schools, located in all parts of the country, offer courses of varying length and cost. Many of these schools include courses in special terminology and office practice as well as in psychology, personality development, and human relations. A growing number of schools provide training in the use of electronic data-processing equipment.

Most schools have set minimum standards for typing and stenographic skills which must be attained by students who wish to receive certificates or diplomas. Many schools require that students type at 50 words a minute and take dictation at 100 words a minute for satisfactory completion of a 9-month course. A typing speed of at least 60 words a minute and the ability to take dictation of at least 120 words a minute are frequently required for satisfactory completion of a 12-month course.

Personal qualifications important to these jobs include manual and finger dexterity and good vision. Employers want workers who are conscientious and who have a friendly manner. For jobs which involve meeting the public, an attractive personal appearance is often required. Discretion, good judgment, and initiative are also important for such jobs, and particularly for those involving greater responsibility.

Typists, stenographers, and secretaries with ability have good possibilities for advancement. A typist may become an expert operator of one or more office machines that require special skill or, with training in shorthand, may ad-

vance to a stenographic position. A stenographer may advance to a position as a secretary, operator of one or more special machines, administrative assistant, or office supervisor. A secretary may become an executive secretary or an administrative assistant or fill other highly responsible positions requiring specialized knowledge of a particular industry or business. Advancement also may come in the form of greater responsibilities and higher salary without any change in job title.

### Employment Outlook

A shortage of workers with stenographic and typing skills has existed in many areas since World War II. Available positions for well qualified persons with these skills and for those with multiple office skills have consistently exceeded the supply in many parts of the country.

Thousands of openings for typists, stenographers, and secretaries become available each year. New opportunities are constantly created by expansion in business and government activities, and thousands of job vacancies are created annually as young women move to higher positions or leave the labor market to assume family responsibilities and for other reasons. Because full-time personnel were not available for employment or because the job did not require a full-time worker, more than 330,000 persons worked part time as secretaries, stenographers, and typists in 1959.

The demand for persons in these occupations is not expected to be affected greatly by technological developments in the next few years, but work requirements may change to some extent with the introduction of new office machinery. Turnover rates will probably remain high, with rates for typists and general stenographers higher than those for stenographers in special fields, secretaries, and reporters. Stenographers and secretaries are expected to continue to have a wider choice of jobs than persons with typing skills only.

### Earnings and Working Conditions

Salaries of typists, stenographers, and secretaries—like many other occupations—are

greatly influenced by the size and nature of the business establishment, the responsibility of the job, the level of skill required, the length of the workweek, and the part of the country or the section of the city in which the job is located.

In 1960, the Bureau of Labor Statistics gathered wage data on a number of office occupations in 73 industrial centers. Junior typists averaged \$45.50 to \$68 a week in those areas for which data were reported; senior typists, from \$55.50 to \$87.50; transcribing machine operators, from \$46 to \$76.50; general stenographers, from \$58.50 to \$87; and secretaries, from \$70 to \$110.

The usual entrance salary in the Federal Government in late 1960 was \$3,500 a year for typists, \$3,760 for stenographers and dictating machine transcribers, and \$4,830 for specialized shorthand reporters. Experienced persons and those with more than the minimum required training may start at a higher salary.

Office workers in private industry generally have a 5-day workweek of from 38 to 40 hours; in New York City, the average is 36 hours. Private and executive secretaries are sometimes required to work longer hours. Federal Government employees work a 40-hour, 5-day week.

Paid vacations and holidays are usual in private industry. Most employees receive 2 weeks' paid vacation each year after the first year of service. Federal Government employees receive 13 days of paid vacation during their first 3 years of service; 20 days during the next 12 years; and 26 days in all subsequent years. A large number of companies provide 3 or more weeks' paid vacation after 10, 15, or more years of service. National holidays and, in some firms, State and local holidays, are usually granted. Most office workers, both in government and in private industry, are employed in establishments which provide health, life insurance, or pension benefits.

(For additional information on earnings and working conditions of typists, stenographers, and secretaries in government, see chapter on Government Occupations.)

### Where To Go for More Information

The following publication provides additional information about these and other clerical occupations, including references to other sources:

Employment Opportunities for Women as Secretaries, Stenographers, Typists, and as Office Machine Operators and Cashiers (Women's Bureau Bull. 263, 1957). Superintendent of Documents, Washington 25, D.C. Price 20 cents.

## Bookkeeping Workers

### Nature of Work

Every business concern must have systematic and up-to-date records of its financial affairs. Keeping these records is the bookkeeper's job. Bookkeepers record day-to-day business transactions in journals and ledgers and on other accounting forms. At regular intervals, they prepare summary statements for their employers showing, for example, the amount of money taken in and paid out by the firm, from whom it came and to whom it went, and the amounts customers owe the firm and the amounts the firm owes to others.

In many small establishments, one *general bookkeeper* (D.O.T. 1-01.02) does all of the different kinds of work necessary to keep a complete set of books. Usually employees in positions of this kind are "hand" bookkeepers; they may use adding and other simple office machines, but they do not operate bookkeeping machines. Often they also do filing, answer the telephone, mail statements to customers, and take care of other office work.

Large business organizations often have bookkeeping departments with many employees working under the direction of a head bookkeeper (often called an accountant). As a rule, each employee handles only one or a few of the many kinds of work necessary to keep a complete set of books. Most of them are *bookkeeping and accounting clerks* (D.O.T. 1-01.30 through 1-01.49) and *bookkeeping machine operators* (D.O.T. 1-02). Accounting clerks in beginning jobs perform routine tasks such as posting items by hand in accounts payable ledgers and recording other financial transactions. They may use adding machines to total accounts and take trial balances. Bookkeeping machine operators in entry jobs often use com-



*Bookkeeping machine operator making entries in a ledger.*

paratively simple bookkeeping machines to do similar work. Experienced clerks and machine operators have much more varied assignments and greater responsibility. An accounting clerk in such a position may not only post and balance accounts but do more difficult work such as preparing summary reports. Experienced machine operators sometimes use very complex equipment adapted to special business needs. In large banks, for example, bookkeeping machine operators add deposits and subtract withdrawals from each depositor's checking account, calculate service charges, and draw up monthly statements for mailing—all on one machine especially designed for bank work.

### Where Employed

About a million workers were employed in bookkeeping jobs in 1960; more than three-

fourths of them were women. Well over one-third of all bookkeeping workers are employed by retail stores or wholesale houses, one-fifth by manufacturing companies, and about one-sixth by finance, insurance, and real estate firms. Substantial numbers are employed also by public utility companies and construction firms and in other business and professional offices.

### **Training, Other Qualifications, and Advancement**

In selecting workers for bookkeeping jobs, most employers hire people who have at least completed high school or business or vocational school. Some prefer applicants who have completed junior college. A business course which includes instruction in typewriting and the use of office machines, as well as in business arithmetic and bookkeeping, is often very helpful, since many bookkeeping workers perform a variety of office duties. An increasing number of large companies offer some on-the-job training for newly hired employees. Other companies cooperate in work-study programs operated by the high schools and business schools in their locality; students enrolled in these programs gain practical experience in part-time jobs that may be helpful to them in obtaining full-time employment after graduation. For a position as head bookkeeper, it is usually necessary to have had extensive bookkeeping experience or some training in accounting.

General bookkeepers and accounting clerks should have above-average aptitude for working with numbers and the ability to concentrate on details. Bookkeeping machine operators need finger dexterity and good coordination of eye and hand movements.

### **Employment Outlook**

Many openings for bookkeeping workers are expected during the early 1960's. In this large occupation, with its high proportion of women, the rate of employee turnover is very high. New employees are constantly needed to replace young women who leave after a few years of employment to marry or take care of their families. In addition, a moderate number of

new jobs will become available as the field continues to expand. However, the trend toward breaking down bookkeeping functions into comparatively routine clerical operations is likely to continue, with the result that the vast majority of openings will be for bookkeeping machine operators and bookkeeping and accounting clerks. Employment opportunities for bookkeepers who are qualified to assume responsibility for a complete set of books will probably continue to be good, although such jobs will be relatively few in number and will generally be filled by promotion from within or by persons with training or experience in accounting.

Over the long run, the growth in the number of bookkeeping jobs will probably be slowed down markedly by the increasing use of mechanical equipment. Also, the duties of many bookkeeping workers are likely to change considerably, as more firms make use of bookkeeping machines, electronic computers, and other modern equipment. Even though the bookkeeping employees who use this equipment will be able to handle considerably more work than formerly, many new jobs in this occupation are nevertheless likely to arise each year, as a result of general economic growth and the increasing complexity of business operations.

### **Earnings and Working Conditions**

Information on the earnings of bookkeeping and accounting clerks and bookkeeping machine operators is available from a 1959-60 survey which covered business and industrial firms in 60 major metropolitan areas. For women employed in beginning jobs as clerks and machine operators, average salaries ranged from about \$55 a week in some cities to \$70 in others; experienced bookkeeping machine operators averaged from \$65 to \$85 a week in most of the cities and experienced women accounting clerks between \$70 and \$90. In general, salaries were highest in very large metropolitan centers, and were somewhat higher in manufacturing than in nonmanufacturing firms. Men earned considerably more than women in similar positions—about \$19 a week more, on the average.



Working conditions for bookkeepers are usually similar to those of other office workers in the firms where they are employed. (See in-

troductory section to this chapter for information on working conditions and on Where To Go for More Information.)

### Office Machine Operators

The kinds of machines used to speed the paperwork in modern business offices are so varied that it would be practically impossible to list them all. They range from simple mechanical devices which open letters to electronic equipment capable of performing highly involved computations. Not all of this equipment is operated by workers classified as office machine operators, however. Some office machines—particularly the simplest kinds which are easiest to operate—are used principally by general clerical employees who spend most of their time in other work and need no special training as machine operators. In addition, statistical clerks and certain other office workers not classified as machine operators, nevertheless are specially trained to operate some kinds of machines because they have to use them extensively in their regular jobs.

This statement is concerned chiefly with the work done by people who operate some of the most common kinds of machines as their main job assignment. Such office machine operators are usually trained workers who can use their equipment accurately and at high speed; they know by heart the keyboards of the adding machines and calculators they use, for example, and they operate these machines by the “touch” system, rather than by the “hunt and peck” system often used by workers without specialized training or experience. Many, like the adding machine operator, keypunch operator, and billing machine operator, have job titles taken from the kinds of equipment they use. (Stenotypists, typists, and transcribing machine operators, and operators of bookkeeping machines and electronic computers are not included in this statement, but are discussed in other sections of this chapter.)

*Billing machine operators* (D.O.T. 1–25.00 through .09) prepare statements relating to customers' purchases. By striking lettered and numbered keys on their machines, they enter on the bill or statement information such as

the customer's name and address, the items bought, and the amounts of money involved in each transaction. Then, when the operator presses other keys, the machine calculates and prints totals, discounts, and other items.

*Adding and calculating machine operators* (D.O.T. 1–25.10 through .19) use a variety of electrical and manually operated machines to make the computations needed in preparing payrolls and invoices, and doing other business and statistical work. By striking numbered keys, operators “put into” these machines the numbers involved in each calculation and then when other keys are pressed, the machines make the desired calculations and record the results automatically. *Adding machine operators* (D.O.T. 1–25.12) use their machines to add and subtract numbers, and sometimes to multiply. The calculator is a more complex piece of equipment than the adding machine and has a much larger keyboard. *Calculating machine operators* (D.O.T. 1–25.13) use the calculator not only to add and subtract but also to multiply, divide, take square root, and do other kinds of computations. Many of the office workers who are expert in operating adding machines and calculators use this equipment only part of the time, and also perform other office duties. However, operators of the most complex calculating machines—that is, comptometer-type calculators which require considerable skill and knowledge on the part of the operators—usually spend full time in this work.

*Mail preparing and mail handling machine operators* (D.O.T. 1–25.40 through 1–25.49) run the automatic equipment which handles office mail when it is received or sent out. Some of these machines open envelopes fed into the machine by the operator, and other machines address, fold, seal, and stamp outgoing mail. Addressing machines are most likely to be used in offices where circulars, magazines, and other materials are regularly sent out to people on

mailing lists. Some of them require metal plates embossed with names, addresses, code numbers, and related information, which are prepared on a special kind of typing machine by *embossing machine operators* (D.O.T. 1-25.42 and .43). The *addressing machine operator* (D.O.T. 1-25.41) selects the desired plates (or, for some machines, stencils), puts them in the machine, places the mail to be addressed on a loading rack, and starts the machine, which then completes the addressing process.

Operators of duplicating and copying machines run equipment which produces copies of typewritten, printed, and handwritten documents more quickly or more inexpensively—or both—than would be possible by typing the copies. Some equipment of this kind—particularly copying machines which use photographic and other chemical processes—can be operated simply by inserting the material which is to be copied and doing little more than pushing a button. Such machines are used mainly to make only a limited number of copies of a document and they can be operated by almost any office employee who has taken a few minutes to learn how. Full-time machine operators are seldom used for this work. Other kinds

of duplicating machines, capable of producing thousands of copies of typewritten and handwritten documents in a single “run,” are more complicated, and are likely to be operated by specially trained *duplicating machine operators* (D.O.T. 1-25.20 through .29) who spend most of their time doing this kind of work. Most machines of this kind are mechanical devices which are rather like small printing presses. The main job of the operators who run them is to insert in the machine a “master” copy of the document to be reproduced (a stencil on some machines, and on others raised type) and then to adjust the mechanism and start the machine. The operator must see that the machine is kept properly adjusted so that it produces copies which are clear and easy to read. The paper used for making copies is fed into the machine, and finished batches of work are removed from it automatically on some duplicating machines; on others this work may be done by hand by the operator.

*Operators of tabulating machines and related equipment* (D.O.T. 1-25.60 through .69) run machines designed to sort and count large quantities of accounting and statistical information. Information to be processed in a tabulating machine is first transferred to cards by *keypunch operators* (D.O.T. 1-25.62). Using machines similar in action to typewriters, these workers punch holes in the cards in such a position that each hole can be identified as representing a specific item of information. *Sorting machine operators* (D.O.T. 1-25.63) then run the punched cards through sorting machines which automatically separate the cards according to the location of the holes and arrange them in any desired order. Next, *tabulating machine operators* (D.O.T. 1-25.64) insert the batches of punched cards into machines which count the various items punched on each card, multiply and make other calculations, and print the results on accounting records and other business forms.

### Where Employed

The number of office machine operators employed in 1960 is estimated at well over 200,000. Most of them are women. Among tabulating



*Keypunch operator records information on cards for machine tabulation.*

machine operators, however, men outnumbered women.

Office machine operator positions are concentrated, to a greater extent than most other kinds of office work, in firms handling a large volume of recordkeeping and other paperwork. Consequently, a great many operators work in large cities where such firms are usually located. Roughly one-third of all office machine operators work for manufacturing companies and about one-fifth for wholesale and retail firms. Large numbers of operators are also employed in banks and insurance companies, and in government agencies. Some office machine operators are also employed in "service centers"—agencies which are equipped with various kinds of office machines and contract to handle, for other firms without this equipment, such tasks as preparing monthly bills and circularizing customers.

#### **Training, Other Qualifications, and Advancement**

Graduation from high school or business school is the minimum educational requirement for all but the most routine office machine operator jobs. For some kinds of work, such as operating comptometer-type calculators and some kinds of tabulating and duplicating equipment, specialized training on the machine is customarily required. For most beginning positions, however, a general knowledge of the kind of equipment used is usually regarded as sufficient. High school courses in the operation of office machines are helpful, and business arithmetic is valuable for the many jobs involving work with figures. It is helpful also for office machine operators to have some knowledge of typing or to be able to operate more than one type of office equipment, since many office positions entail varied assignments.

Employers usually give newly employed office machine operators some on-the-job training. Even employees with some earlier training or experience in office machine operation need time to familiarize themselves with the particular kinds of equipment they will be using on the job. Often minor—and sometimes major—differences exist between the calculating machines produced by one manufacturer and by

another, for example; and new models sometimes differ a great deal from older models. The amount of instruction and on-the-job experience needed by a new employee may vary from a few days to several months, depending chiefly on the type of machine. A few days only may be required to train operators of some duplicating machines, for example, and a few weeks to give keypunch and calculating machine operators the basic training they need. Generally, it takes several weeks before operators of tabulating machines become skilled in setting and adjusting their equipment and learn how to do simple wiring of plugboards. Operators of tabulating equipment are often trained at company expense in special schools established by equipment manufacturers.

Finger dexterity, good coordination of eye and hand movements, and good vision are important for most office machine operator jobs. It is helpful for billing and calculating machine operators to have sufficient sense of mathematical relationships to be able to detect obvious errors in computations. Some mechanical ability is advantageous, especially to duplicating and tabulating machine operators.

Most employers follow a promotion-from-within policy, taking into consideration seniority and on-the-job performance as shown by supervisors' ratings and recommendations. Promotion may be from a beginning, routine machine job to a position in which the worker operates several different kinds of office machines or is responsible for training beginners and for the accuracy of their work. Many office machine operators are employed in comparatively large offices where they work under the supervision of section and department heads, and further advancement may be to positions such as these. Sometimes, employees are advanced by transferring them to the operation of more complex machines—for example, from tabulating to electronic computing machines.

#### **Employment Outlook**

Many thousands of job openings for office machine operators are expected each year through the mid-1960's. Some will arise as business organizations continue to grow in size

and the volume of billing, computing, duplicating, and other work continues to mount. The number of service centers with equipment to perform this kind of office work for other firms on a fee basis is expected to increase also. Other openings for office machine operators will be created, in all likelihood, through the introduction of new types of mechanical office equipment which speed recording, copying, and other office jobs. And still other openings will occur because of the need to fill positions left vacant by workers who retire, die, or leave for other reasons; most machine operators are young women, many of whom are likely to stop working after a few years of employment in order to stay home and care for their families.

Although the number of workers employed as office machine operators is likely to increase substantially during the years just ahead, in the long run, this expansion in employment will probably be slowed somewhat by further advances in office automation. Precisely how automation may affect specific areas of clerical employment is difficult to foresee. As yet, offices are only beginning to make use of computers and other modern electronic equipment. Undoubtedly, as time goes on, employers will find many new uses for this kind of equipment, and as machines take over an increasing amount of clerical work, the number of billing, computing, and tabulating machine operators needed in some offices will be substantially reduced. The total number of workers employed to operate these and other kinds of office machines will continue to rise, nevertheless.

### Earnings and Working Conditions

Average weekly salaries ranged from about \$48 to \$106 for women in five office machine operator occupations, according to a 1959-60 survey in 60 large metropolitan areas. The table below indicates the highest and lowest average salaries reported in these areas.

Differences in salary levels were due, to some extent, to differences in the cost of living, in the general level of wages, and in the kinds of industries found in the different communities. Manufacturing firms generally paid higher salaries than retail stores and other nonmanufacturing industries. Since the work assignments of tabulating machine operators were found to differ a good deal in difficulty, the average salaries were reported separately for those who operated simple machines and did routine repetitive work (class C operators), for operators handling more difficult equipment (class B), and for those who operated a variety of tabulating machines and worked on long and complex reports without close supervision (class A).

<i>Average weekly salaries, 1959-60</i>				
		<i>Highest</i>		<i>Lowest</i>
Billing machine operators.....	\$87.50	(San Francisco-Oakland)	\$48.00	(Sioux Falls, S. Dak.)
Calculating machine (comptometer) operators.....	83.50	(Los Angeles-Long Beach)	52.00	(Lubbock, Tex.)
Duplicating machine operators.....	70.00	(Detroit)	48.50	(Des Moines)
Keypunch operators....	81.50	(San Bernardino-Riverside-Ontario)	53.50	(Greenville, S.C.)
Tabulating machine operators				
Class A.....	106.50	(Los Angeles-Long Beach)	83.50	(Boston)
Class B.....	90.00	(Portland, Oreg.)	64.50	(Birmingham)
Class C.....	82.50	(Atlanta)	54.50	(Richmond, Va.)

The salaries paid to men employed in office machine operator jobs were often higher than those of women in the cities covered in this survey. For example, men employed as tabulating machine operators earned, on the average, \$5.50 to \$8 a week more than women doing similar work.

Working conditions for office machine operators are usually similar to those of other office workers in the same firms. (See introductory section to this chapter for information on working conditions and on Where To Go for More Information.)

## Electronic Computer Operating Personnel

### Nature of Work

Using an electronic computer to make up a payroll or do any other kind of "data processing" requires operators trained to run several different kinds of mechanical equipment. Some of these workers operate the console of the computer while it is processing the data. Others may run auxiliary machines which must be used because computers get their instructions and record the results in a special code, or "machine language"; these auxiliary machine operators run equipment which either prepares the computer's "input" by translating facts and figures into this machine language, or else reverses the process and translates the computer's "output" back into words and numbers.

The number and kinds of workers needed to operate a computer and the auxiliary equipment that go to make up a computer system depend on its size and type, and on the nature of the work processed. Some computers are no bigger than an office desk, and others are large enough to fill a whole room. In addition, computers may be used for such varied purposes as keeping inventories and taking care of other office records, running production lines in factories, and tracking satellites. Most computers are used to process large quantities of office records, however, and the operators' jobs, as described here, illustrate the kind of work done when computers are used in this way. The operating personnel of computer systems used for technical and scientific work often have somewhat different responsibilities and are not covered in this statement.

A computer's input consists of the data to be processed and the step-by-step instructions prepared by programmers which tell the machine how the work is to be done. (Information about the occupation of Programmer is given elsewhere in this Handbook. See index for page number.) Preparing data for input into the computer is, in many computer systems, the job of keypunch operators. These workers operate machines which record facts and figures on cards, by punching holes in different positions. In other cases, where the computer's

input is put on paper tapes instead of cards, the job may be done by operators of adding or bookkeeping machines or typewriters with special attachments which perforate tapes. The operators of these different kinds of machines do much the same work as workers using the same general type of equipment for other purposes. (For additional information on these occupations, see statements on Typists, Office Machine Operators, and Bookkeeping Workers elsewhere in this chapter.)

In some computer systems, punched cards or paper tapes can be used directly to feed information into the computer. The fastest computers, however, get their input from magnetic tapes (narrow strips of plastic or metallic tape, on which data have been recorded in the form of magnetic spots or characters.) Computer systems of this kind include card-to-magnetic-tape converters or paper-tape-to-magnetic-tape converters which are designed to transfer data to magnetic tapes. These machines are run by *peripheral equipment operators* (D.O.T. 1-25.60 and .98). A converter operator may be required to wire a fairly simple plug board, and must know how to interpret signals from a panel of neon lights on the machine. Converter operators should also have a general understanding of how the whole computer system works, be able to identify cards or tapes which have been incorrectly punched, and recognize other situations which might prevent the system from operating properly.

Once the facts and figures to be processed have been converted into the form used by the computer, the data are ready for the "run." This is the responsibility of the *console operator* (D.O.T. 1-25.17)—or computer operator, as he is sometimes called. The console operator first examines an instruction sheet for the run which has been prepared for him by the programmer. After he has ascertained the kinds of information the computer is to produce and the procedure to be followed, the console operator readies the equipment, makes sure the computer is loaded with the tape or cards needed, and starts the run. Sometimes he operates the console and all of the auxiliary equipment di-

rectly connected with the computer and sometimes a peripheral equipment operator helps with this. Console operators may have dozens of control switches to manipulate and control panel lights to observe during the course of a run. If the computer stops running, or its lights signal an error, the console operator must try to locate the source of the trouble. Some console operators do fairly standardized work whereas others, in senior positions, have considerable responsibility for the proper functioning of the whole computer system. Frequently, console operators supervise the employees who operate peripheral equipment.

Before people can read a computer's output, it must be translated from machine language to words and numbers. In some systems, this is done by "printers" or other machines directly connected to the computer and run by the console operator or his assistant. Particularly when the computer is a high-speed machine, however, this work may be done on tape-to-card converters, high-speed printers, and other specialized machines run by peripheral equipment operators. These operators, like operators of other kinds of peripheral equipment, may have to wire plug boards and watch for lights on their machines which signify errors. Some types of peripheral equipment are relatively difficult to operate and, when computer systems include such equipment, operators sometimes specialize on one kind of machine. Many operators run all kinds of peripheral equipment used in a computer system, however.

The tape or cards used in processing data on a computer are stored after the run, and are often used again and again—as, for example, in making up a payroll at the end of every pay period. A *tape librarian* (D.O.T. 1-20.04) may be responsible for storing tapes and making them available when they are again needed, or else this may be done by a console or peripheral equipment operator.

Since electronic computers are very expensive, they are often kept in operation 16 or 24 hours a day, and in this case, the people who operate the consoles and auxiliary equipment work on two or three different shifts. Usually they all work under the general direction of a chief supervisor, and employees on each shift



Courtesy of U.S. Army

*Console operator running console of electronic computer as assistant checks magnetic tape.*

have a supervisor who often serves as console operator on that shift.

### Where Employed

Nationwide, only a few thousand computers were in use in early 1961. No exact figures are available concerning the number of console and peripheral equipment operators, but it was undoubtedly extremely small compared with the great number of workers employed in many other clerical occupations. Most operators are men, although tape librarians are usually women.

Operating personnel work chiefly in metropolitan areas—for the most part in government agencies and in insurance companies, banks, transportation and other public utility companies, and large manufacturing firms. Many operators of this kind of equipment are also employed in service centers which process statistical data for other firms on a fee basis.

### Training, Other Qualifications, and Advancement

Many employers, when they install computers, fill their operator positions by transferring employees from other types of jobs—frequently from jobs as operators of tabulators, calcula-

tors, and bookkeeping machines which may no longer be needed after the computer is installed. However, computer operating personnel may also be recruited from outside the firm, when an employer is unable to find among his own employees a sufficient number of workers with the special abilities needed.

In hiring outsiders, employers usually require at least high school graduation. For positions as console operator, some college training may be required. In the Federal Government, applicants for peripheral equipment operator jobs must be high school graduates also, unless they have had specialized training or previous experience in some related kind of work. Console operators employed by the Federal Government are generally required to have a college education or its equivalent in work experience; or they may be able to qualify for appointment on the basis of previous experience in computer work and general aptitude for it, as demonstrated by special tests.

Private employers are equally careful in selecting individuals to operate the expensive equipment installed in computer systems. Like the Federal Government, many business firms screen applicants for operating positions by giving them tests designed to measure their aptitude for the work, and especially their ability to reason logically. Men are often given preference in hiring, partly because work is often done on late afternoon and night shifts, and partly because men, once they have been trained for their jobs, are more likely to remain in them for prolonged periods than are women.

Beginners hired for work of this kind, or transferred to it from other positions in their firms, are seldom expected to have specific training as operators. Most employers provide the necessary training after the worker is hired. The training of peripheral equipment operators may require a few weeks, that of console operators from 2 to 6 months or longer. Console operators usually attend classes where they are taught not only how to operate the console but also the fundamentals of programming. This period of formal training is followed by further instruction on the job.

As they gain experience, operating personnel may be assigned to operate more complex

pieces of equipment. Eventually they may be promoted to supervisory positions or jobs which combine some supervisory duties with console operation. Because console operators can often acquire, through on-the-job experience, a good basic understanding of programming, those who show an understanding of programming problems have good chances of being selected and trained by their employers for programmer positions.

### **Employment Outlook**

The use of electronic data-processing equipment is expected to increase very rapidly during the 1960's and, as a result, the number of jobs for operators will also increase rapidly. In addition, a limited number of openings will occur as operators of computer systems transfer to other kinds of work or stop working for other reasons. As in the past, employers will fill some of the openings by training people already in their employ, but many other positions will be filled by hiring young people who demonstrate an aptitude for this kind of work.

More important, perhaps, than the total number of openings likely to occur is the possibility that job requirements may change in this very new field of work. Computer systems are constantly being modified and, along with these changes, the duties of console and auxiliary equipment operators are also changing. If operating a computer console continues to require the special aptitudes now often needed, employment opportunities will be very good for the comparatively limited number of candidates who can qualify. If, on the other hand, the next few years bring changes which simplify the work, it may become easier to recruit and train competent console operators and correspondingly harder for inexperienced newcomers to enter the occupation.

### **Earnings and Working Conditions**

Information about the salaries of computer system operating personnel in almost 500 companies throughout the country is available from a private survey conducted in 1960. The average salary for beginning console operators

was about \$90 a week. Operators with more experience generally earned from \$95 to \$105, and senior console operators and others with supervisory responsibilities earned between \$110 and \$135 a week. The salaries of peripheral equipment operators working with high-speed printers averaged about \$110 a week; and for tape librarians, the average was about \$90. The difference between the salary of the lowest and highest paid employees in each of these job classifications was much greater than these figures suggest, however. In each case, some employees earned more than twice as much as others. This wide range was due to differences in salary levels in various parts of the country and in individual companies and industries and, to some extent also, in the complexity of the work performed by operators classified under the same job titles.

Salaries of computer personnel in the Federal Government are roughly comparable with those in private industry. In 1960, trainee console operators started at about \$83 a week (\$4,345 a year) and, with additional experience, could eventually work up to about \$143 a week

(\$7,425 a year). Salaries were higher for operators with supervisory responsibilities. Starting salaries for peripheral equipment operators were about \$72 a week (\$3,760 a year). Experienced peripheral equipment operators earned up to \$103 a week (\$5,335 a year), depending on the nature of their jobs and their years of service.

Operators of electronic computer systems generally work the same number of weekly hours and enjoy the same holidays, vacations, and other benefits as do most office employees. (See introduction to this chapter.) Since many computers are operated on a two- or three-shift basis, scheduled hours for some console and peripheral equipment operators include late evening or night work. Tape librarians usually work only when day shifts are on duty.

#### **Where To Go for More Information**

Association for Computing Machinery,  
14 East 69th St., New York 21, N.Y.

See introduction to this chapter for additional sources of information.



## SALES OCCUPATIONS

Sales workers are the link between the manufacturers and other producers of goods and services and the people who use these products. A list of what sales workers sell would be practically endless—houses, shoes, steel, motor boats, magazines, insurance, stocks and bonds, and food, to name just a few examples. Their customers include not only housewives and other individuals, but also government agencies and business enterprises of all kinds.

Almost 4.5 million workers were engaged in selling goods and services in 1960. More than half of these people work in retail trade—selling items one at a time or in small quantities, chiefly to customers in stores. Another large group work as outside salesmen for wholesale houses—selling goods in large quantities to retailers who will later resell these products in their stores. A third group, many of whom are traveling salesmen, work for manufacturing companies, selling products to wholesalers and other business concerns. Wholesale salesmen and manufacturers' representatives together comprise about one-fifth of all people in sales occupations.

The nature of the work done by each of these three largest groups of sales workers, the training they need, and the employment outlook for them are discussed in following sections of this chapter. The chapter also contains separate discussions of several other large sales occupations—real estate agent and broker, life insurance agent, and property and casualty insurance agent and broker.

There are, in addition, many other smaller sales occupations—including among them such diverse ones as newsboy, advertising salesman, huckster and peddler, demonstrator, stock and bond salesman, and personal shopper. Together, these occupations afford thousands of job opportunities for people with widely different educational backgrounds and personal characteristics.

Women make up more than one-third of the workers in all sales occupations taken together. The great majority of women salespeople work in retail stores. Many thousands of women are employed also as insurance and real estate agents but, in these fields as in most other kinds of sales work, women are far outnumbered by men.

Employment in sales occupations is expected to increase fairly rapidly during the 1960's. By 1970, the total number of sales workers may reach 5.5 million—1 million more than in 1960. In retail stores, however, a growing proportion of the sales force will probably be part-time workers hired to supplement regular sales staffs on Saturdays and during evening shopping hours. In this large field of sales employment, the number of full-time salespeople is likely to increase only moderately during the next 10 years.

The main reason for anticipating an increase in employment of sales workers is the prospect of rapid population growth, coupled with business expansion and rising income levels. As the volume of sales rises, however, employment is likely to increase at somewhat different rates in the various fields of sales work, because of special circumstances affecting each differently. For example, it is expected that the "self-service" techniques which are already in use in supermarkets and some other stores will be adopted by increasing numbers of retailers; and as customers are able to select more and more of their purchases from counter displays, without direct help from salespeople, the rise in employment of sales clerks is likely to slow down. Self-service will affect employment principally in large retail stores. It will have little, if any, effect on employment in other kinds of sales work. In property and casualty insurance, for example, future employment levels will be influenced instead by such factors as the long-term upward trend in personal incomes, which may enable more people to own

automobiles and other kinds of expensive property customarily insured against theft and other risks. Information about employment

prospects in the major fields of sales work and the particular factors most likely to affect each field is given in the statements which follow.

## Salesmen and Saleswomen in Retail Stores

(D.O.T. 1-70.; 1-75.; and 1-80.)

### Nature of Work

The success of any retail business depends in large part on its salespeople, whether they sell automobiles or pianos, or everyday things such as toothpaste or spools of thread. Courteous and efficient service from behind the counter or on the sales floor does much to satisfy a customer—and satisfied customers build a store's good reputation. Aside from the direct contact with customers which is a part of all sales jobs, however, there are differences in the duties, skills, and responsibilities of sales people which are fully as great as the differences in the kinds of merchandise they sell.

In selling expensive items such as furniture, electrical appliances, or some types of wearing apparel, the primary job of the salesman or saleswoman is to assist the customer as much as possible in order to create an interest in, and a desire to purchase, the store's merchandise. The salesperson may spend much of his time showing various styles or colors, demonstrating an article, pointing out its desirable features, answering questions about its construction or use, and helping the customer to make a selection. Special skills are required to sell certain items. For example, an automobile salesman must be able to drive and explain the advantages of power brakes and steering or other features of a new model car; whereas a salesperson in a music store may be required to know how to play an instrument.

People who sell standardized articles in daily use, such as the things sold in grocery and drug stores, may have little more to do than assemble the items desired by each customer. In stores with goods clearly labeled and arranged so that they can be easily taken off shelves or counters by customers—as in many 5- and 10-cent stores and newsstands—the salesclerks' chief duties are to tell the customer where to find merchandise, suggest additional



*Saleswoman shows customer a new shade of lipstick and matching nail polish.*

items for sale, wrap or bag the customer's purchases, and take his money and make change.

In addition to their selling duties, most salespeople must make out sales or charge slips. In many stores, they receive cash payments and give change and receipts. Salespersons are usually responsible also for keeping the sales counter, shelves, or floor neat and presentable at all times. In small retail stores, they may assist in ordering merchandise, stocking shelves or racks, marking price tags, taking inventories, preparing attractive merchandise displays, and promoting regular and special sales. (Route salesmen who sell bread, milk, and other products directly to customers on a regular route are discussed in the chapter on Driving Occupations in this Handbook. See index for page number.)

### Where Employed

Two and one-half million salespersons—more than half of them women—were employed in

1960 in about 70 different kinds of retail businesses throughout the country. The stores where they worked range in size from the small drug or grocery store which employs only one part-time salesclerk to the giant department store employing hundreds of salespersons. Men predominate in stores selling furniture, household appliances, hardware, farm equipment, shoes, and lumber, and in automobile sales agencies. Women outnumber men in department and general merchandise, 5- and 10-cent, apparel and accessories, and drug stores.

Sales jobs are found in nearly every community. However, the vast majority of salespersons work in large cities and in the shopping centers of nearby suburban areas.

### **Training, Other Qualifications, and Advancement**

Employers generally prefer to hire high school graduates for most sales jobs. Subjects such as salesmanship, commercial arithmetic, and home economics help to give the student a good background for selling positions. Many high schools have distributive education programs, which include courses in merchandising, principles of retailing, and retail selling, and also provide an opportunity for students to get practical experience by working part time in local stores. Store owners cooperating in these programs usually offer full-time employment to students completing the courses.

Young people interested in obtaining sales jobs may apply directly to the personnel office in larger retail establishments. Applicants are usually given personal interviews and, in some large stores, are required to take special tests which indicate their aptitude for sales work. Employers prefer to hire people with a pleasing personality, an interest in sales work, a neat appearance, and the ability to express themselves well. Prospective salespersons should also be able to stand on their feet for long periods. Part-time selling experience is helpful in obtaining a full-time job.

Practically all retail stores give new sales personnel some kind of on-the-job instruction. In small stores, this training may consist only of a short talk about the job, given by an experienced salesperson who may also be the

proprietor; in large stores, training programs are often more formal and may last several days. Beginning salespeople are usually taught how to make out sales slips and use the cash register; they are also told about selling procedures and credit and other store policies.

Executive positions in large retail stores are often filled by promoting college graduates who were hired as trainees for executive work and were first assigned to sales jobs to gain practical experience. However, retail selling is one of the few remaining fields in which an employee with initiative and ability may be selected for promotion, regardless of his educational background. Most stores offer good opportunities for persons without a college degree to advance to executive positions. Some salespersons advance to positions as buyers, department managers, or store managers, whereas others, particularly in large stores, may be transferred to administrative positions in personnel, public relations, or other fields of work. Opportunities for advancement are more limited in small stores where one person, usually the owner, frequently performs most managerial functions. Sales experience in retail stores is often a valuable asset in qualifying for other types of sales jobs.

### **Employment Outlook**

Thousands of job openings for salespersons will occur each year throughout the mid-1960's. Many will be new sales jobs which arise particularly in the rapidly growing suburban areas of big cities. The greatest number of employment opportunities will result, however, from the need to replace employees who stop working or leave retailing in order to take jobs in other fields. Turnover is high in retail stores because of the many saleswomen who leave to marry or to take care of families, and the large number of young people who change employment after gaining some sales experience. In addition to full-time sales jobs, there will be an increasing number of part-time jobs. These will provide many opportunities for regular part-time employment each week, as well as occasional work during peak selling periods, such as

before the Christmas holidays and during special sales.

Over the long run, the number of salespeople employed in retail stores is expected to rise fairly rapidly. The volume of goods sold will increase as the population grows. Furthermore, rising income levels will increase the demand for products which are usually sold only after the salesperson has spent a good deal of time with the customer—for example, electrical appliances which prospective buyers want to see demonstrated, and articles of clothing which customers prefer to try on before making their purchase. It is also probable that the weekly hours worked by salespeople in many stores will be shortened during the 1960's, and, since most stores are likely to remain open for business 50 or more hours a week, this will require the services of additional full- and part-time sales workers.

The extent to which sales employment is expected to rise will be limited somewhat by the changes taking place in the way goods are sold. "Self-service"—already the rule in large supermarkets—is rapidly being extended to drug, variety, and other kinds of stores, with the result that more and more articles are being purchased by customers without help from salespeople. The trend toward larger retail stores will also serve to limit the growth in sales employment during the 1960's, since large stores generally require fewer salespeople than small ones, relative to the volume of sales. In view of these developments, it appears unlikely that employment in sales work will rise as fast as the volume of sales increases during the next 10 years.

Sales workers have more stable employment than workers in many other occupations. When retail trade is affected by downturns in the economy, employers—particularly in large stores—can reduce the number of their employees by not filling vacancies that result from turnover, or they can eliminate some part-time jobs. Competition for jobs as salesmen and saleswomen tends to increase when other jobs are hard to find, however, because workers customarily employed in other occupations can often qualify for some kinds of sales jobs.

### Earnings and Working Conditions

Salaries of beginning salespersons may range from less than \$30 to more than \$50 a week, depending on the type and size of store, its geographic location, and other factors. A small number of union contracts, covering salespeople in variety, hardware, bakery, drug, jewelry, and apparel stores, showed minimum salaries for inexperienced salespersons in 1960 generally within this range. Experienced salespersons usually receive from \$10 to \$25 a week more than beginners in the same store. The highest earnings, often averaging \$100 or more a week, are received by persons who sell automobiles, major appliances, and furniture. These salespeople frequently are paid a straight commission—that is a certain percentage of the amount of sales they make—or a salary plus a commission on sales. Earnings of salespersons in retail trade are usually highest in large metropolitan areas and lowest in rural communities. In retail stores where the customer can easily make his own selection of goods—for example, in variety stores—salaries, as a rule, are lower than in apparel and other stores where salesmanship is an important factor.

Salespersons in many retail stores are allowed to purchase merchandise at a discount, often from 10 to 20 percent below regular prices. These discount privileges are sometimes extended to other members of the family. Some retail stores, especially the large ones, pay all or part of the cost of employee benefits such as life insurance, retirement, hospitalization, and surgical and medical insurance.

Many salespersons—though by no means all—work a 5-day week of 40 hours or less. Since Saturday is a busy day in retailing, employees usually work that day and have another weekday off. Longer than normal hours may be scheduled before Christmas and during other peak periods; employees who work overtime hours receive either additional pay or an equal amount of time off during slack periods. Some salespersons regularly work one or more evenings a week, especially in stores located in suburban shopping centers.

Salespeople in retail trade usually work in clean and well-lighted places. In many parts of the country, stores are often air conditioned.

Some kinds of sales positions take the salesperson outside the store; for example, an automobile salesman may visit prospective customers at their homes and take them on demonstration rides.

#### Where To Go for More Information

Information on retailing courses given in high schools may be obtained from the Superintendent of Schools or the Coordinator of Distributive Education in each community, or from the State Supervisor of Distributive Edu-

cation in the Department of Education at each State capital.

Information on careers in retailing may be obtained from local retailers' or merchants' associations or from:

Committee on Careers in Retailing, National Retail Merchants Association,  
100 West 31st St., New York 1, N.Y.

A list of colleges offering specialized courses in retailing is available from:

American Collegiate Retailing Association,  
24 Waverly Place, New York 3, N.Y.

## Salesmen in Wholesale Trade

(D.O.T. 1-85. and 1-86.)

### Nature of Work

Wholesale salesmen have an important part in the movement of goods from the factories producing them to the retailers who sell them. Usually, each of the wholesalers for whom these salesmen work deals in a line of products of one general type but made by several different manufacturers. For example, a wholesaler of automotive supplies fills his warehouses with the thousands of parts needed for automobile repair and maintenance, so that owners of garages, service stations, and retail stores can get their supplies from one place instead of ordering each part from the factory where it is produced.

A wholesale salesman makes his sales by calling at regular intervals on retailers and purchasing agents of large businesses or other organizations in the territory assigned to him. He shows them samples, pictures, or catalogs of the items his wholesaler stocks, and tries to convince them that they will profit by buying these products. The salesman does very little "pressure" selling of any one article, since he may have a very large number of items to sell—as many as 50,000 if he works for a wholesaler of hardware or drugs. It is part of his job to persuade the retailer or purchasing agent to become a regular customer of his wholesale house.

Success in wholesale selling depends on establishing a good personal relationship with customers. To do this, the salesman must give

good service and prove that he is dependable. One of his major responsibilities is to see that retailers are kept well supplied at all times. When a retailer finds that he can rely on a salesman, he may allow the salesman to check the store's stock and make up an order for the items the salesman thinks can be sold before his next regular visit.

Wholesale salesmen often help retailers by making window and counter displays of special or sale items and by suggesting ways to advertise new products. They may advise retailers on such matters as how much to charge for various items or how best to display the goods.



*Wholesale salesman writes order as druggist checks stock.*

Some salesmen also collect the money owed to their wholesale companies.

Salesmen employed by wholesalers spend part of their time doing paperwork. They must write up orders and send them to the wholesale house, plan the next day's work schedule, make appointments, compile lists of prospects, make out expense accounts, study literature relating to their products, and write reports.

### **Where Employed**

About a half million salespeople were working for wholesalers in 1960. The great majority were men. Wholesale houses are located mainly in cities but the territories assigned to their salesmen may be located in all parts of the country. A salesman's territory may cover a small section of a city with many retail stores, or, in less populated regions, it may cover more than half a State.

Leading employers of wholesale salesmen are companies that sell foods, including fresh, canned, and frozen products. Other salesmen work for wholesalers dealing in drugs, electrical appliances, and other products which people buy for home use, or they sell products used by business firms, such as automotive equipment, industrial, supplies, and building materials.

### **Training, Other Qualifications, and Advancement**

In hiring trainees for sales work, most wholesalers look for young men with pleasant, outgoing personalities, a great deal of persistence, and the ability to get along with people. High school graduation is the usual educational requirement. However, in selecting salesmen of technical products—for example, air-conditioning systems, medical supplies, and electronic equipment—employers are showing increasing preference for men with some specialized training beyond high school.

A young man who has the qualifications needed for selling may start in a nonselling job in a wholesale company and later apply for a sales job, or he may be hired directly as a sales trainee. In either case, the beginner must usually work in several kinds of nonselling jobs

before being assigned as a salesman. He may begin in the stockroom or shipping department where he becomes familiar with the thousands of items the wholesaler carries. Later, he may be transferred to the pricing desk to learn prices of articles and discount rates for goods sold in quantities. In his next assignment, he is likely to be an order clerk, with the job of writing up orders that come in from customers by telephone. In this job, the trainee comes to know many of the customers by name. The amount of time spent in these initial jobs varies from company to company; but, as a rule, it takes at least 2 years before the wholesaler feels that the trainee is prepared to go out and deal with customers. Most wholesalers team a beginner with an experienced salesman who helps him with problems related to person-to-person selling. After he has learned the ropes, the junior or beginning salesman is assigned a small territory of his own.

Experienced salesmen with the necessary leadership qualities and sales ability may advance to supervisory and managerial jobs in the sales field—to sales supervisor, sales manager, or vice president in charge of sales. Other executive positions in wholesale houses are also frequently filled by men with sales experience. Many men prefer to continue selling, however, because they enjoy this type of work. Furthermore, a very successful salesman can often earn more in selling than in many other occupations.

### **Employment Outlook**

Opportunities to work up to wholesale selling jobs are expected to be good through the mid-1960's for energetic high school and college graduates with pleasing personalities. Competition for retailers' business will be keen and employers will therefore be seeking well-qualified salesmen. In addition, as many as 10,000 job openings may occur each year because of the retirement or death of experienced salesmen. Openings will also arise as some workers transfer to other jobs; a considerable amount of turnover occurs among new entrants who fail to make good.

Over the long run, employment of wholesale salesmen is expected to expand moderately.

Wholesalers will require larger sales forces, as population growth and rising living standards create a demand for more goods. Some wholesalers will probably also need more salesmen to look after the needs of the new customers who come to them as more and more drug stores, food markets, and other retailers diversify the lines of merchandise they carry. On the other hand, certain changes in the way retailers are likely to purchase the goods they sell may well tend to limit the number of additional salesmen needed. As the number of chain stores increases and individual stores grow in size, the orders placed with wholesalers become larger, rather than more numerous. Also, large retailers may obtain some lines of merchandise direct from manufacturers rather than through wholesalers. On the whole, therefore, it appears likely that the increase in the number of wholesale salesmen during the 1960's will be somewhat slower than the increase in the volume of goods distributed.

### **Earnings and Working Conditions**

Earnings of most junior or beginning salesmen in wholesale houses were between \$400 and \$500 a month in 1959, according to a private survey. Earnings of experienced wholesale salesmen were generally within a range of from about \$6,000 to \$15,000 a year in 1959, the amount depending, in part, on the nature of the product sold. Some successful salesmen make considerably more than \$15,000 a year.

Most employers pay their salesmen a straight commission—that is, a percentage of the dollar sales they make. Some wholesalers, however, pay a fixed salary plus commission. Practically all wholesale salesmen have steady year-round work; but their sales (and therefore their commissions) may vary from month to month be-

cause the demand for some things—heating equipment and air conditioners, for example—is greater during certain seasons than others. Because of this, it is becoming more and more common for companies to pay their experienced salesmen a weekly or monthly “draw” against the commissions they can be expected to earn annually, and this “draw” provides them with a steady income, regardless of how their sales fluctuate from one month to another. Most companies either provide each salesman with a car or an allowance if he uses his own car. Only a few wholesale houses pay their salesmen an allowance for other expenses on the road.

Wholesale salesmen must travel in order to do their work. If their territories are small, they may be able to return home every night; but if their territories are large, they may be home only on weekends. Salesmen generally carry heavy catalogs and sample cases and spend a great deal of time on their feet. They may have long working days, since they must make calls at the times most convenient for their customers. They sometimes work evenings or weekends.

Most salesmen have paid vacations of from 2 to 4 weeks, depending on length of service with their employers. They are usually covered by company benefit programs including life insurance and pensions, and hospital, surgical, and other medical care.

### **Where To Go for More Information**

Information on wholesale selling may be obtained directly from local wholesale houses or from associations of wholesalers in many of the larger cities. If no local association is available, write to:

National Association of Wholesalers,  
1001 Connecticut Ave. NW., Washington 6, D.C.

## **Manufacturers' Salesmen**

(D.O.T. 1-85. and 1-86.)

### **Nature of Work**

Practically all manufacturers—whether they make airplanes or dolls, women's dresses, or nuts and bolts—employ salesmen to sell their

products. Manufacturers' sales representatives sell mainly to other business concerns—sometimes to factories, railroads, banks, and other companies; sometimes to wholesalers and retail



*Manufacturer's salesman shows wholesale dealer the superior construction of a remote-control motor starter.*

dealers; and sometimes to hospitals, schools, and other large institutions. The manner in which they go about making their sales and the types of buyers they deal with, depend to a large extent on whether they are selling highly technical products such as factory machinery, metals, or chemicals, or nontechnical products such as clothing, canned foods, or stationery.

The great majority of manufacturers' salesmen sell nontechnical products, chiefly to wholesalers, less often to big retail stores. Their job is to call on wholesale houses and other firms in their assigned territory to introduce new products and see that orders for established items keep coming in. Sometimes, they promote the sale of their products by setting up displays in hotels and holding conferences with wholesale salesmen in their areas. Some manufacturers' salesmen—for example, those employed by drug manufacturers—call on physicians and other potential users to inform them about their companies' product "line" and to distribute samples.

Salesmen of nontechnical products need a thorough knowledge of the items made by their companies and a sales approach adapted to the particular kind of goods they handle. Thus, a salesman of crackers or cookies may emphasize

the popularity of his manufacturer's products, the attractive way in which they are packaged, and the many different kinds available. In selling clothing, a salesman needs a knowledge of style, design, fabrics, and the details of clothing manufacture.

Salesmen of highly technical products—electronic equipment or air-conditioning systems, for example—are often called sales engineers or industrial salesmen. Because purchases of these products are likely to involve large amounts of money, the prospective buyers with whom the salesman deals are usually heads of departments or other factory executives. A sales engineer should have a thorough knowledge of his firm's products and a great deal of imagination and sales know-how in order to convince officials that buying new machinery or particular types of raw materials will make their operations more efficient and profitable. To do this, he may spend days or even weeks in a prospect's plant analyzing manufacturing problems and discussing technical details. Often, sales engineers work with the research and development departments of their own companies, devising ways in which their products can be adapted to a customer's particular needs. After the equipment is sold and installed, sales engineers sometimes train employees to operate and maintain it. They make frequent return visits to be sure that the equipment is giving the desired service. Because sales engineers may work several months with a prospect before completing a sale, they are likely to make fewer sales than other manufacturers' salesmen, but each sale may amount to hundreds of thousands of dollars.

Although manufacturers' salesmen spend most of their time in visiting prospective customers, they also have to do some paperwork. They must plan their work schedules, make appointments, compile lists of prospects, conduct some of their own sales correspondence, make out expense accounts, and study literature relating to their products. They may also be required to write reports, not only on the sales made, but sometimes on sales prospects in an area, their competitors' products, and the credit ratings of customers.



### Where Employed

More than 400,000 manufacturers' salesmen were employed in 1960. Some of these salesmen work out of their company's "home office," often located at a manufacturing plant. The majority, however, work out of branch offices, which are usually located in big cities where there are the greatest numbers of prospective customers.

More salesmen work for companies which produce food products than for companies in any other industry. Large numbers of technical salesmen are employed by manufacturers of machinery, such as office and store machines, tractors and other farm equipment, and industrial machinery. In addition, many salesmen work for manufacturers of apparel, fabricated metal products, textiles, paper and related products, chemicals and pharmaceuticals, and in the rapidly growing field of electrical and electronic equipment.

### Training, Other Qualifications, and Advancement

College graduates are generally preferred for training as manufacturers' salesmen because most employers believe a college background is helpful to a salesman in dealing with high-level executives of other companies. It is still possible, however, for persons with little or no training beyond high school to enter this field, provided they have demonstrated exceptional ability. As a rule, the job of selling complicated industrial equipment requires a technical education; for example, manufacturers of electrical equipment, heavy machinery, and some types of chemicals prefer to hire engineering or chemistry graduates for their sales staffs. (More detailed information on chemists, engineers, and others who may work as industrial salesmen is given in the statements on each of these professions. See index for page numbers.) Some training in pharmacy is usually required for jobs as drug salesmen. (See index for page reference to statement on Pharmacists.) Persons with college degrees in liberal arts or business administration are often preferred by manufacturers of nontechnical products.

Although prospective salesmen can often get jobs by applying directly to sales offices of manufacturing concerns, many are recruited

by manufacturers who send representatives to college campuses each year for the purposes of interviewing students who are about to graduate. Recruiters look for students who not only have the required academic qualifications but also have records of participation in extracurricular activities. As salesmen must be able to meet and get along well with many different people, recruiters pay close attention to the personality traits and appearance of students. Preference is likely to be given to those with pleasant but forceful personalities who make a good impression in manner, speech, and dress. A recruiter may hire directly or recommend applicants to his company. In some cases, several executives of a company interview applicants before final selections are made.

A beginning salesman is usually given some training before being sent out to sell. Some companies, especially those manufacturing complex technical products, have formal training programs which may last 2 or more years. During this period, the trainees may be rotated among jobs in several different departments in the plant and office to learn all phases of production, installation, and distribution of the product. Other companies arrange to have trainees take university courses in subjects related to their products. Still others give short courses at the plant followed by intensive training in a branch office, under the supervision of field sales managers.

Sales representatives with good sales records and leadership ability may advance to higher level positions, such as sales supervisor, branch manager, or district manager. Those with unusual ability and managerial skill may eventually move up to sales manager or other executive positions; a sizable proportion of the top executive jobs in industry are filled by men who were once salesmen

Because salesmen come in frequent contact with businessmen outside their own firms, they often find opportunities to transfer to better jobs with the companies to which they have sold products in the past. Some salesmen go into business for themselves as manufacturers' agents selling similar products of several manufacturers. Experienced salesmen can often find opportunities in related occupational fields, in-

cluding training of sales representatives, advertising, and market research.

### Employment Outlook

Well-qualified people are expected to have good opportunities as manufacturers' salesmen through the mid-1960's. As competition in promoting the sale of products is expected to be keen, many manufacturers will expand their sales forces. Replacement needs will account for an even larger source of job opportunities; retirements and deaths alone will probably create at least 8,000 openings each year. Nevertheless, manufacturers are likely to be selective in hiring. For the most part, they will look for the "go getter"—the salesman with topnotch ability.

Over the long run, the growth in population, expansion in the Nation's economy, and the rise in living standards can be expected to create a demand, not only for more products, but for new kinds of products. Manufacturers, in competing with each other to get new and improved goods on the market, will continue to place more and more emphasis on sales activities. The number of manufacturers' salesmen employed will therefore rise considerably. Technically trained men who are able to sell complex industrial equipment are likely to be particularly in demand.

### Earnings and Working Conditions

Starting salaries ranging from \$4,800 to \$5,200 a year were being offered in 1960 by large manufacturing companies to men college graduates recruited for sales trainee jobs. Starting salaries for salesmen of technical products and for salesmen with the master's degree were about \$400 a year higher. Beginners without college degrees generally start out in other types of jobs at lower salaries but may be given training at company expense to prepare them for higher earnings as salesmen.

Some manufacturing concerns pay their salesmen a straight commission based on the dollar amount of sales made; others pay a fixed salary without regard to the amount of sales; the majority, however, use a combination of these

two plans. The amount earned through commissions varies according to the salesman's ability, geographic location, nature of products sold, types of customers, the percent of commission allowed, and other factors. It is difficult, therefore, to express the earnings of experienced salesmen in terms of averages. Many manufacturers' salesmen earn \$10,000 or more a year; a few—particularly in the technical sales field—earn several times this figure.

Some manufacturer's salesmen have large territories to cover and do considerable traveling. Others have relatively small territories and work mostly in the neighborhood of their "home base." For example, a salesman of heavy industrial equipment may be assigned a territory covering several States and often has to be away from home for days or weeks at a time. On the other hand, a salesman of food products may work within such a small area that he can return home each evening.

Salesmen are usually reimbursed for their expenses when away from home on business trips. Some of the items which may be included in expense accounts are transportation costs, hotel bills, meals, tips, customer entertainment, telephone calls, and stenographic services. Some companies either provide a car or pay an allowance to salesmen who use their own cars.

Salesmen have no standard working hours, as they make calls at the times most convenient to their customers. Also, they often have to travel at night or on weekends. Frequently, they spend evening hours writing reports, planning itineraries, and scheduling appointments. In most cases, however, they can plan their own work schedules so as to take time off when they want it. Most salesmen have paid vacations of from 2 to 4 weeks, depending on their length of service. They usually share in company benefit programs, including life insurance; pensions; and hospital, surgical, and medical benefits.

### Where To Go for More Information

General information on manufacturers' salesmen can be obtained from:

National Sales Executives, Inc.,  
630 Third Ave., New York 17, N.Y.

## Life Insurance Agents

(D.O.T. 1-57.10)

### Nature of Work

Life insurance agents sell policies that provide life insurance and retirement annuities for individuals or groups. Many agents also sell various types of special life insurance policies, as well as accident and health insurance. (The chapter on Occupations in the Insurance Business gives additional information about the nature of the insurance business. See index for page number.) Life insurance agents are sometimes called life insurance salesmen. Also, because they may be required to judge insurance risks on some policies, they are often referred to as life underwriters.

A life insurance agent spends most of his time meeting people in their homes or places of business to explain different types of insurance. Part of the agent's time is spent in his office looking up information about the kinds and amounts of insurance best suited to his clients' needs, and drawing up lists of new prospects for insurance sales. He may also arrange for the physical examination often required before a person can obtain life insurance, or help applicants fill out application forms, assist them with their benefit claims, and perform other services. An agent who sells "industrial" life insurance (usually small policies on which the premiums are paid weekly or monthly) is responsible also for collecting the premiums.

More than 200,000 life insurance agents (fewer than 5 percent were women) were employed full time in 1960 in selling policies on an individual or group basis. Many were combination agents hired by companies to sell both ordinary life policies (usually in amounts of \$1,000 or more) and industrial insurance. Most life insurance agents represent only one company and work in its branch or district offices.

Unlike salesmen who sell goods or property which a buyer can see, the life insurance agent sells a service—financial protection. The better the service, the more successful the agent, since satisfied policyholders are likely to continue paying on their policies and may, in addition,

refer friends to their agent and so bring him new insurance prospects. The length of time policies remain in force is frequently used as a yardstick by companies in rating their agents. The agent must not only be able to explain to each prospect in clear nontechnical language the various kinds of policies available, how much they cost, and the benefits they provide, but he must also try to balance each client's ability to pay against his need for protection and help him to make a wise choice about the policy he buys. During one or more visits required to sell a policy, the agent must establish a personal relationship which inspires confidence in his own ability and integrity.

Agents have a great deal of independence and personal responsibility for planning their work. They must get together lists of prospective customers from referrals made by personal acquaintances and satisfied clients, or other sources. Additional business often depends on the individual agent's ability to gather pertinent information on policyholders—for example, births in a family, purchase of a new home, improvements in income status, or other factors that indicate a prospective sale of additional insurance.



*Life insurance agent calls at clients' home to discuss new policy.*

### Where Employed

Life insurance agents are employed in agencies located throughout the country. The greatest numbers of agents are in the most heavily populated States—particularly in large cities and their suburbs and in small communities with rapidly growing industries. Sales of industrial life insurance are usually restricted for each agent to a specified locality within which the agent has been assigned exclusive rights—a so-called “debit area” which is sometimes a small town or part of a city. Restrictions of this kind do not generally apply to the sale of other types of insurance, however.

### Training, Other Qualifications, and Advancement

Most life insurance companies seek people at least 21 years of age, to train as life insurance agents. The applicants must have the aptitude and personal qualities necessary for selling insurance and the ability to grasp insurance fundamentals. Although no formal educational requirements exist, the majority of agents hired in recent years have had some college training and many are college graduates. Many companies prefer persons with previous experience in business and in dealing with people. Since effective selling often depends on a sound personal relationship between agent and client, the insurance agent who is poised, a patient listener, and able to answer his client's questions simply and clearly has a good chance of success.

Young people interested in beginning as life insurance agents may apply to agencies in their own communities, where they already have the advantage of knowing many people who might become prospects for the insurance they sell; or they may write to the main offices of insurance companies. In hiring agents, many companies, in addition to interviewing applicants personally, give tests to determine an applicant's aptitude for selling life insurance. A well-rounded program of on-the-job training and education is conducted by most companies for beginning agents. In addition, agency managers assist agents with their individual sales problems and sometimes assign experi-

enced agents for a brief period to sell jointly with beginners.

An agent must be licensed in each State where he sells insurance. To obtain a license, the applicant must be sponsored by the company he represents, and the company usually pays for the license. As of late 1960, 43 States and the District of Columbia issued a permanent license only to an applicant who had gained sufficient knowledge of State insurance laws and life insurance fundamentals to pass a written examination; in the majority of States, prospective agents were given temporary licenses which were good for a limited period before they took the examination for a permanent license. The remaining seven States issued licenses without examination, but usually required the sponsoring company to submit a statement on matters such as the applicant's place of residence and character.

An agent who has started to sell insurance may continue in several ways to broaden his knowledge of the life insurance field. He may take advanced courses in insurance subjects offered at some colleges and universities; he may participate in industry-sponsored educational programs offered by the Life Underwriter Training Council and by the American College of Life Underwriters; or he may attend institutes, conferences, and seminars sponsored by various other insurance organizations. By taking college-level courses, an agent who has a high school education or its equivalent, plus at least 3 years of insurance experience, may prepare himself for examinations which qualify him for membership in the American Society of Chartered Life Underwriters and the designation Chartered Life Underwriter (CLU)—a recognized mark of attainment in the insurance field. The examinations which an agent must take to qualify as a CLU test his ability to apply to insurance problems his knowledge of life insurance fundamentals and of economics, business law, taxation, trusts, and finance. An agent may also increase his knowledge through advanced courses in insurance subjects and special life insurance marketing institutes (held at Purdue and Southern Methodist Universities).

A life insurance agent who demonstrates

sales ability and leadership qualities may be promoted to assistant manager or manager of an agency office, provided he is interested in work of this kind. Many particularly successful agents prefer to remain in sales work rather than take management positions, however. A few agency managers advance eventually to regional supervisor of a group of agencies or to a home office position such as that of superintendent of agencies or vice president or president of the company.

### **Employment Outlook**

Employment opportunities for life insurance agents are expected to be good through the mid-1960's. Company expansion plans indicate that there will be about 5,000 new full-time agent positions annually for several years. In addition, many thousands of agents will be needed each year to replace those who retire, die, or change to other types of work. Employment opportunities for agents and agency managers are expected to be particularly numerous in suburban areas of large cities and in cities with less than 100,000 population.

The number of life insurance agents will probably continue to rise at a fairly rapid rate over the long run. The employment increase is expected to be considerably less than the very rapid increase anticipated in the dollar value of insurance sales, however. At least some of this dollar increase will result from a rise in the size of the average policy sold, and hence will have little effect on the total number of agents needed. Furthermore, it is likely that an increasing number of individuals will participate in group insurance plans which, relative to the number of individuals covered, require the services of fewer agents. At the same time, group insurance programs and the pensions and other benefits provided under the social security system will continue to make the agent's job more complex, because these forms of protection must be taken into account by an agent planning individual policies which are to provide additional protection.

The trend toward giving preference to college graduates in selecting insurance agents is likely to continue, and companies are expected

to place greater emphasis on in-service training of beginning agents. Nevertheless, the preference of many employers for applicants who have already had some business experience will probably remain a factor favoring the employment of mature workers, and many companies will probably continue to allow their experienced agents to engage in some selling activity after they retire.

### **Earnings and Working Conditions**

A beginning agent is usually guaranteed a minimum salary for the first year or two while he is building up a clientele. Thereafter, the earnings of insurance agents are based on a percentage of the premiums paid by clients to whom they have sold policies. Usually the commission on a newly sold policy is a comparatively large percentage of the premium. Then, on all policies which are kept in force, agents receive a smaller renewal commission each year for several years and, subsequently, a still smaller annual service fee. As renewal commissions build up over a period of years, an agent's total income increases even if he sells only about the same amount of insurance each year. After 4 or 5 years, a life insurance agent may earn from \$7,500 to \$10,000 a year; eventually, some highly successful agents may earn as much as \$25,000 or more. Many companies have various kinds of benefit programs for agents employed in branch or district offices—such as life insurance and pensions, and hospital, surgical, and medical benefits.

Agents make several calls a day and frequently use a car in their work. They usually pay their own automobile expenses, although a few companies now pay part of this cost. Sometimes, it is necessary for agents to make evening or weekend appointments for the convenience of clients.

### **Where To Go for More Information**

General information on employment of agents may be obtained from personnel directors of life insurance companies and local organizations of life insurance agents. Information on State licensing requirements may be obtained from the department of insurance

at any State capital. Information on life insurance agents is also available from :

Institute of Life Insurance,  
488 Madison Ave., New York 22, N.Y.

Life Insurance Agency Management Association,  
170 Sigourney St., Hartford, Conn.

National Association of Life Underwriters,  
1922 F St. NW., Washington 6, D.C.

## Property and Casualty Insurance Agents and Brokers

(D.O.T. 1-57.10)

### Nature of Work

Property and casualty insurance agents and brokers sell policies which help individuals and companies cover expenses and losses in case of fire, burglary, traffic accidents, hurricanes, and many other kinds of emergencies. Almost any kind of property or personal possession can be insured against loss or damage, whether it be a factory, or ocean liner, or a valuable piece of jewelry. Policies may also cover costs arising when policyholders are injured or when other people receive injuries for which policyholders are legally responsible. Property and casualty agents and brokers are sometimes called property and casualty insurance underwriters. (Additional information about the property and casualty insurance field is contained in the chapter on Occupations in the Insurance Business. See index for page number.)

An agent selling property and casualty insurance usually works under contract as the authorized representative of several insurance companies—less frequently of only one company—and he writes each policy he sells in accordance with company requirements. A broker, on the other hand, is not under contract to any particular company. He does not write the policies he sells but orders them, either directly or through an agent, from the insurance company he feels can best meet his clients' needs. In other respects, agents and brokers do much the same kind of work. They sell the same types of insurance, collect premiums from policyholders, attend to renewals and changes in policy coverage, and assist their clients in getting claims settled. They may supervise the work of solicitors and salesmen whom they employ to sell insurance.

Most agents and brokers in this field sell several different kinds of policies and must have a broad knowledge of many lines of prop-

erty and casualty insurance. Some specialize in only one general type such as accident and health, or automobile insurance. Practically all of these salesmen, including those who specialize, must know about the protection afforded for many different kinds of risks; an owner of a home or industrial plant, for example, may buy one policy protecting him against losses caused by such different hazards as fire, burglary, explosion, and windstorm. And many a car owner has one insurance policy covering financial losses he might incur should his car be stolen or damaged by collision, or cause injury to other people or damage to other people's property. In addition, all brokers and most agents, since they deal with the policies of more than one insurance company, must be well informed about the differences—both small and large—in the nature of the protection each company offers against each type of risk.

Agents and brokers spend a great deal of their time explaining policy terms to prospects and evaluating insurance needs. They must not only thoroughly understand insurance fundamentals, but they must be able to establish sound personal relationships with their clients, many of whom seek advice as well as information about insurance requirements.

Agents and brokers must also do a certain amount of office work related to their sales activities. They usually spend at least a part of each day planning schedules of calls, working out the details of insurance programs for clients, and making sure that policies are properly written and delivered to clients. As a basis for additional sales, they draw up lists of prospects, keep up to date on changes which might affect their clients' insurance needs, and try to assist their policyholders in any way possible. The agent or broker who continues to look after the interests of his policyholders,

whether by helping them file claims or by suggesting the need for additional coverage, usually makes a success of his career in insurance.

### **Where Employed**

More than 125,000 agents and brokers were selling property and casualty insurance in 1960. The agencies and brokerage firms out of which they work do business in every section of the country. Many are one-man organizations or partnerships operating on a relatively small scale. Still others are local sales offices associated with large brokerage firms employing hundreds of people throughout the country.

Agents are located not only in large cities, but also in towns and in suburban areas where the growth in population and in ownership of automobiles and homes has created many opportunities for the sale of property and casualty insurance. Some brokers are also located in small cities, but most are in the big population centers—New York, Chicago, Philadelphia, and Los Angeles.

### **Training, Other Qualifications, and Advancement**

All agents and most brokers must obtain licenses in the States where they sell insurance. Two-thirds of the States require an agent to pass a written examination which usually covers the insurance laws of the State and property and casualty insurance fundamentals. To be eligible for the licensing examination in some States, an applicant must meet certain educational requirements in the field of insurance. States not requiring examinations generally issue licenses upon receipt of statements on such matters as the agent's residence and character.

Large agencies and brokerage firms often prefer to hire new salesmen who are college graduates or have had some college training. Such beginners, particularly if they have a general background in subjects such as accounting, economics, and business law, are likely to be quicker to grasp insurance fundamentals and acquire an understanding of the property and casualty field. Selling this kind of insurance often requires specialized knowl-

edge on the part of the salesmen. For example, the agent or broker selling liability insurance to a homeowner must be informed about what hazards are most likely to cause injuries around a home, and he must know about his client's legal obligations, should injuries occur. Again, in helping to work out insurance programs to cover manufacturing plants and plant employees, agents and brokers may need to be familiar with matters such as production processes, construction problems, the kinds of losses that occur in industry, and the measures that may be taken to insure workers' safety.

Newcomers, who usually start by selling the simpler types of policies, may increase their knowledge of the insurance business by experience and by study under company or industry-sponsored programs. Many insurance companies afford new agents opportunities for training in home offices before they start selling. Many agencies and brokerage firms also have programs ranging from formal training to on-the-job supervision—which help new salesmen. Other training is offered through the Insurance Institute of America, which has an educational program for people wishing to learn the fundamentals of property and casualty insurance. Certificates are issued to those who pass Institute examinations. The National Association of Insurance Agents offers elementary and advanced study in the same field.

Opportunity for advanced study is available also through a program offered by the American Institute for Property and Liability Underwriters, Inc. Under this program, salesmen and other insurance company employees may study at home or in classes conducted by colleges, insurance societies, and company groups; after passing five written examinations and completing 3 years of satisfactory insurance experience, they may qualify for the designation of Chartered Property Casualty Underwriter (CPCU). This designation—a recognized mark of attainment in the insurance field—is valuable to persons interested in becoming brokers or operating their own agencies. It may also help insurance salesmen and underwriters to qualify for responsible home office positions.

Among the personal characteristics which are especially helpful to agents and brokers in

their contacts with clients is ease in dealing with people. They also need a good sales approach and the ability to explain insurance matters simply and clearly. In addition, since agents and brokers are largely responsible for directing and planning their own work, they must be willing to take the initiative in locating prospects for sales and in giving service to policyholders.

### **Employment Outlook**

Several thousand openings for property and casualty insurance agents and brokers are anticipated annually through the mid-1960's. Many will be new positions created to meet the growing needs of individuals and business firms for this type of insurance. Other openings will arise because of the need to replace agents and brokers who retire or leave the field for other reasons.

The number of people working as agents and brokers is likely to increase fairly rapidly in the 1960's, as the population grows and business expands. Since most businessmen and other policyholders budget insurance as a necessary expense, every expansion in industrial plant or equipment, as well as every home, automobile, or other expensive item purchased by consumers, represents a potential sale of insurance. Continued extension of public liability laws, such as workmen's compensation and automobile liability laws, will also create a large insurance market. Not only will there be a need for additional agents and brokers to sell an increasing number of policies, but the greater value of insurance sold may well result in higher earnings for agents and brokers. Although employment prospects are generally favorable for agents and brokers, competition for sales—always keen in the insurance field—will continue to be strong.

### **Earnings and Working Conditions**

New salesmen employed by firms selling property and casualty insurance are usually paid moderate salaries while they learn the

business. Once they have become established, however, most salesmen are paid on a commission basis and their income depends largely on their ability to find prospective clients and make sales. Their commissions represent a percentage of the annual premiums on the new policies they sell and on policy renewals; agents and brokers continue to be paid renewal commissions even when they are forced to stop working temporarily because of illness or some other emergency. After a few years, when an agent or broker has built up a clientele, commissions may total from \$5,000 to \$10,000 annually. Highly successful agents and brokers earn substantially more.

The agent or broker who owns his own business must pay his own operating expenses, like any other independent businessman. Major items are usually rental payments and clerical salaries, which vary with the size and location of the agency. Agents and brokers generally pay their own automobile and other transportation expenses.

### **Where To Go for More Information**

Information on employment may be obtained from most property and casualty insurance companies and agencies. Licensing information may be obtained from the department of insurance at any State capital.

Further information on the property and casualty insurance field is available from:

National Association of Insurance Agents, Inc.,  
96 Fulton St., New York 38, N.Y.

The National Association of Mutual Insurance Agents,  
829 Investment Bldg., 1511 K St. NW., Washington  
5, D.C.

Information concerning training in the property and casualty insurance field is available from:

The Insurance Institute of America, Inc.,  
266 Bryn Mawr Ave., Bryn Mawr, Pa.

The American Institute for Property and Liability Underwriters, Inc.,  
266 Bryn Mawr Ave., Bryn Mawr, Pa.



## Real Estate Salesmen and Brokers

(D.O.T. 1-63.10 and .20)

### Nature of Work

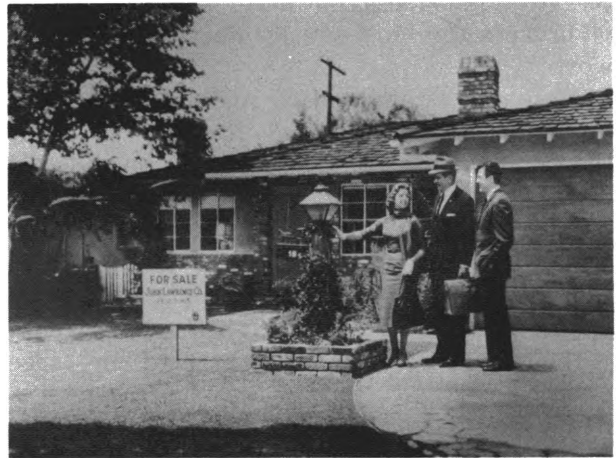
The main job of real estate salesmen and brokers is to find prospective buyers for homes and other properties and to make sales. They act as agents of the property owners in these transactions—hence the title “real estate agent,” which is sometimes applied to both groups.

*Salesmen* are employed by brokers mainly to show and sell real estate. *Brokers* are independent businessmen who not only sell real estate but sometimes rent and manage properties, make appraisals, arrange for loans to finance purchases, and develop new building projects. In addition, brokers manage their offices, advertise properties, and do other things necessary to run their businesses.

The majority of real estate salesmen and brokers sell houses. Some specialize in selling either low-price or expensive homes. A few, usually those in large real estate firms, handle multimillion dollar hotels, giant office buildings, and other extremely valuable commercial properties. Still other brokers and salesmen specialize in farm properties or unimproved land.

Salesmen spend a good deal of time outside their offices showing properties. Because real estate usually costs a great deal of money, most people buy it only after careful investigation. For this reason, a salesman may have to meet several times with a prospective buyer to discuss properties. In answering questions, he will emphasize those selling points which are likely to be most important to each buyer. To a housewife looking at a house, for example, he may point out the convenient floor plan and the fact that schools and shopping centers are close by; to her husband, he may emphasize the soundness of the construction and the attractive financing arrangements available.

In selling a property, especially a commercial property, the real estate salesman or broker must know the tax rates and zoning regulations which apply to it, and be able to discuss such matters as insurance needs. It is important that he try to meet the buyer's needs and preferences



*Real estate salesman showing home to prospective buyers.*

whenever possible, without exceeding the buyer's ability to pay; otherwise, a great deal of time may be lost if the buyer cannot qualify for the loans required to finance a purchase. Whenever bargaining on price becomes necessary, the salesman or broker should follow carefully the seller's instructions and be skillful in making counteroffers, in order to get the best possible price. In the closing stages of the sale, the real estate salesman or broker often arranges for a loan, a title search, and the meeting at which the new owner finally takes possession of the property.

Real estate salesmen and brokers also work in their offices, checking listings of properties for sale or rent and making telephone calls to prospective clients. They may also answer telephone inquiries about properties, arrange appointments to show real estate, and keep records on properties sold. Real estate salesmen and brokers generally have a great deal of independence and personal responsibility for planning their work. It is often necessary to work evenings and weekends.

### Where Employed

More than 600,000 people were licensed as real estate salesmen and brokers in 1960;

perhaps as many as a fifth of the licenses were held by women. Many of these licensed salesmen and brokers work only part time in the real estate business, however. A large number of brokers combine real estate with insurance work.

Most real estate brokers and salesmen work in small businesses located in every section of the country. Some are employed in the real estate departments of banks and insurance companies. Most of the relatively few big real estate firms are in large metropolitan areas; salesmen employed by these firms are often assigned to work in a specific section of a city. Although agents are concentrated in large cities, opportunities are increasing in smaller, newly developed areas with rapidly growing industries and populations.

### **Training and Other Qualifications**

A license is required for work as a real estate salesman or broker in every State and in the District of Columbia. Most States require prospective agents to pass written examinations which generally include questions on the State license law and fundamentals of real estate transactions. The examination is more comprehensive for brokers than for salesmen. In addition, in more than one-fourth of the States, candidates for the broker's license must have had a specified amount of experience as a real estate salesman (generally from 1 to 3 years); in some States, credits in real estate education may be substituted for experience. State licenses usually can be renewed annually without reexamination. Real estate agents who move to another State must generally qualify under the licensing law of that State.

Although a specified amount of education is seldom required, employers prefer to hire real estate salesmen who have at least a high school education. Aptitude for selling and skill in dealing with people are essential. Maturity is rated by employers as an important attribute, because agents who show a broad understanding of a homebuyer's problems and who are able to gain his confidence have a better chance of making a sale.

Young men and women interested in begin-

ning jobs as real estate salesmen often apply to brokers in their own communities, where they can use to advantage their knowledge of their local neighborhoods. The beginner usually works under the direction of an experienced salesman or broker while he learns the practical aspects of real estate selling. After a few years of experience, the salesman who becomes a licensed broker may open his own office.

There are several ways in which beginners may obtain training for real estate work, and experienced agents may add to their knowledge of the field. Many local real estate boards which are members of the National Association of Real Estate Boards (NAREB) sponsor courses in subjects such as real estate fundamentals, principles, and practices; real estate law; and real estate financing. Agents who handle the more complex work of selling commercial properties or those who wish to enter other phases of real estate work—appraisal, mortgage financing, and property development and management—will find advanced courses helpful. Such courses are also offered by many local real estate boards. In addition, various affiliates of the NAREB—for example, the American Institute of Real Estate Appraisers—offer course work in their specialized areas. A number of colleges offer one or more courses in real estate and some offer the bachelor's degree with a major in real estate; a few offer advanced degrees.

A member of the NAREB may use the term "realtor," and this designation has prestige value in the real estate field. Qualified persons may become members of the American Institute of Real Estate Appraisers, the Institute of Real Estate Management, and the National Institute of Farm Brokers (all affiliated with the NAREB). Such membership indicates recognition in specialized fields.

### **Employment Outlook**

Many opportunities to enter the real estate field are expected during the mid-1960's. Competition for sales will remain keen, however. Increasing population, the growing size of families, and frequent changes of residence are among the major factors expected to help in

maintaining a high level of real estate activity. However, anyone seeking a career in this field will have to compete with many thousands who spend only part of their time selling real estate. Although this part-time work enables many people to supplement their income from other sources, it decreases opportunities for full-time agents to make sales. Nevertheless, persons who have an aptitude for selling and who are able to finance themselves during periods when business is slow, will find many opportunities to establish a career in real estate. In general, mature men will be most in demand, but women are finding increasing opportunities because of their familiarity with many special home features particularly attractive to housewives who play an important part in deciding on home purchases.

Opportunities for starting positions in large companies will be best for young people with specialized training in real estate and closely related fields, such as appraisal, property development, and management. A number of openings for college graduates with training in real estate will also arise in banks, insurance companies, and other large firms with specialized real estate departments.

It is expected that employment of real estate salesmen and brokers will increase fairly rapidly toward the end of the 1960 decade and during the early 1970's. The demand for services of this kind will increase because a great many young people will then be reaching the age at which they will be marrying and seeking homes.

Many openings in real estate work will also continue to arise from the need to replace real estate agents who retire or leave the occupation. The average age of real estate salesmen and brokers is considerably higher than that of workers in most occupations, and death and retirement rates are high. In addition, a relatively large number of agents transfer to other fields of work.

### **Earnings and Working Conditions**

Commissions on sales are the main source of earnings for most real estate salesmen and

brokers. The usual commission on the sale of a moderately priced home was 5 percent in 1960, although 6 percent was being paid in a growing number of localities. Thus, the sale of a house in the \$10,000–\$12,000 price range usually brings a commission of \$500 to \$720. When the broker makes a sale, he receives the full commission. When a salesman employed by a broker or real estate firm makes a sale, however, he usually receives only a portion of the commission—often half—and his employer receives the rest.

Earnings depend greatly on the type of property sold. Agents who deal principally with commercial and industrial properties usually earn considerably more than those who sell homes. Probably most full-time real estate agents earn between \$5,000 and \$10,000 a year, according to the limited data available. Beginners, of course, usually earn less. At the other extreme, there are many people in specialized real estate work, such as appraising and mortgage financing, with yearly incomes of \$20,000 or more.

Income usually increases as an agent gains experience, but earnings are also affected by individual ability, geographic location, economic conditions, and other factors. Those who are active in community organizations and on local real estate boards can broaden their contacts and, as a result, may increase their earnings. Earnings, especially for beginning salesmen, are often irregular; a few weeks or even months may go by without a sale, and then several sales may be made close together.

Salesmen are provided with office space by the brokers for whom they work. They are expected to furnish their own automobiles. Those going into business as brokers generally need a modest amount of money to equip a small office and to meet expenses such as rent, advertising, and sometimes salaries of office workers. Beginning real estate salesmen and brokers should also have enough money to support themselves until their income from commissions becomes large enough to meet their business expenses and provide them with a living.

**Where To Go for More Information**

Information on licensing requirements for real estate salesmen and brokers is available from the Real Estate Commission or Board located in each State capital. This information can also be obtained from most local real estate organizations. Many States can furnish

manuals which help applicants prepare for the written examinations they are required to take.

Information on education and training, and a list of schools offering real estate courses may be obtained by writing to:

Department of Education, National Association of  
Real Estate Boards,  
36 South Wabash Ave., Chicago 3, Ill.